North Coast Watershed Assessment Program

LAND USE IN THE MATTOLE WATERSHED

Fay Yee
Forester II, RPF 2395
California Department of Forestry and Fire Protection

TABLE OF CONTENTS

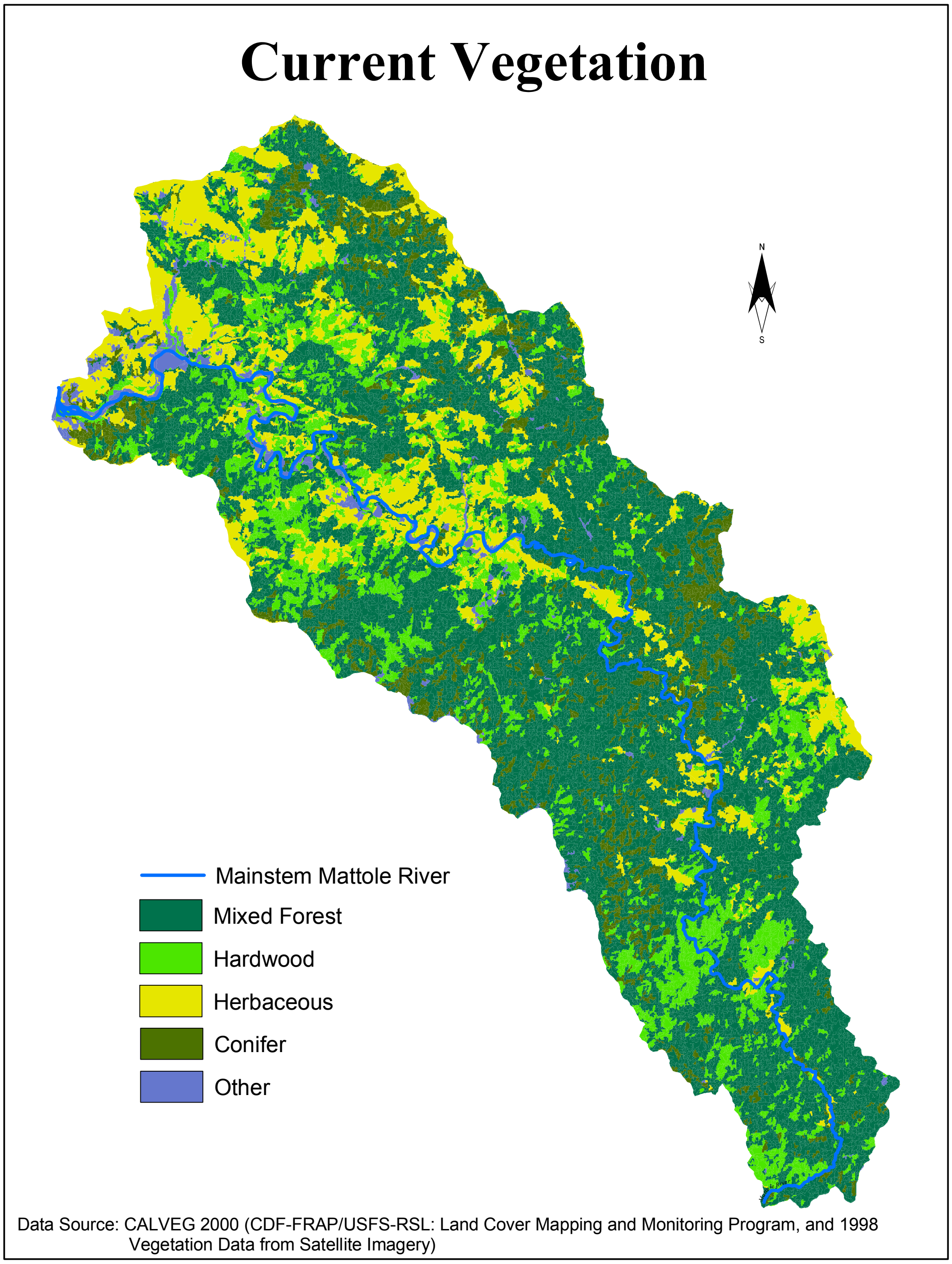
List of Figures

List of Tables

Overview

Prior to European settlement, coniferous forest extended throughout most of the 190,000 acre Mattole watershed. Natural prairie grassland was concentrated in the northern and western portions of the basin, but prairie soils occur throughout the basin, mostly on ridge tops. The structural attributes, seral stages, and mix of species on the forestlands are determined by a combination of physical, biological, and disturbance factors. Physical factors include soil, moisture, temperature, and topography. The Mattole is unusual within the Northern California coast as it has very little redwood forest present; this is thought to be primarily due to the King Range blocking the summer fog. The interaction between soil types and the strong salt-laden air are possible factors that influence the redwood free areas of much of the Mattole and Bear River watersheds (Zinke, 1996). Forested stands consist primarily of tan-oak and Douglas-fir as the major tree species. Madrone, big-leaf maple, chinquapin, bay, canyon live-oak and alder occur as minor components whose presence generally varies according to soil type, slope and aspect, and controlling summer moisture regimes. Seral stages are dependent upon disturbance regimes, both natural and human induced. Natural disturbance includes fire started by lightning, drought, and insect and disease regimes, especially epidemics. Human disturbance includes the regular widespread burning by the Native Americans, grazing, road-building, timber harvesting, and conversion of natural landscapes to agricultural or residential uses. Other coniferous species include yew, isolated sugar pine stands and, in the southern headwaters that receive summer fog, redwood (Figure1).

The Mattole watershed is subdivided in several ways in this report (Figure 2). The finest scale used is the CalWater planning watershed designations. The next tier is the subbasin level. Subbasins are planning watersheds grouped together because of geographic location, ownership similarities, or other attributes. These are the Northern, Eastern, Southern, and Western subbasins. Data summaries in this report are based on entire CalWater planning watersheds and while the Estuary subbasin is not in the data set as a land area it is considered a part of the river system in this report. The largest level is the Mattole watershed. Most acreage numbers are derived from calculated results using ArcView™, a spatially explicit geographic information system. Total acreages may vary slightly due to rounding during the processing of data.



California Department of Forestry and Fire Protection - NCWAP - 2002

Figure 1: Current Vegetation Type Distribution in the Mattole Watershed

Figure 2: Mattole Subbasins and Planning Watersheds

Ownership

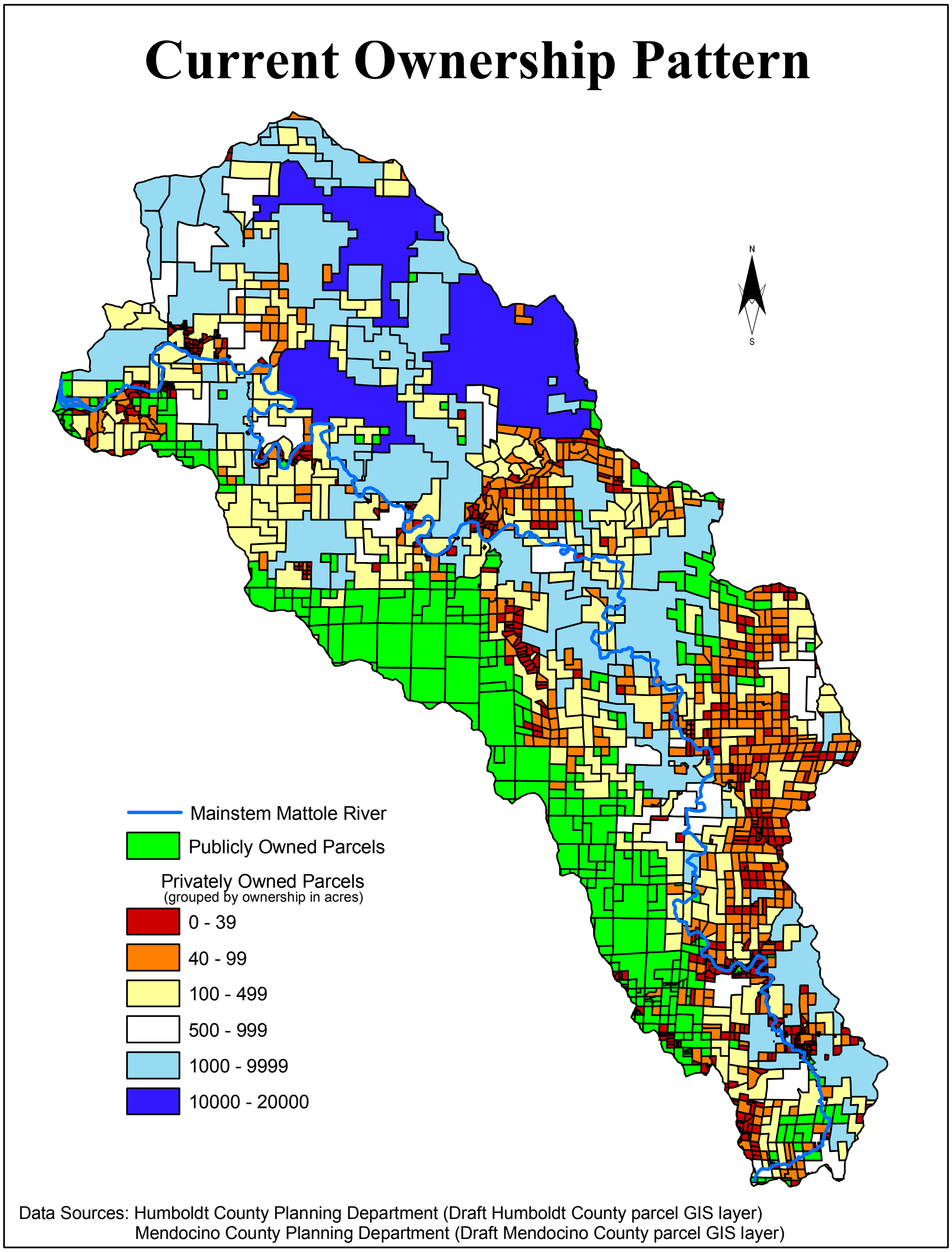
Current land ownership of the Mattole consists of numerous owners with a varied mix of land use objectives. The early discovery of oil created a land rush and early parcel claims by numerous individuals, many of whom stayed after the oil was discovered to be phenomena that were not of commercial quantity. Several periods of ranchland subdivision created many small residential parcels whose owners struggle with attempts to live off the land or to commute to the Garberville or Eureka business areas. Table 1 is derived from both Humboldt and Mendocino County Geographic Information System (GIS) electronic files. These are both subject to discrepancies as to title since they are only updated periodically. For example, in recent years, several parcels owned by Eel River Sawmills have changed hands, primarily to the public sector. Not all of these transactions are reflected in this database.

Due to limitations in the available databases, ownership is divided into three categories. The public category is dominated by the Bureau of Land Management. California Department of Parks and Recreation holds parcels in the Southern Subbasin and along the watershed boundary ridgeline in the Eastern subbasin. With the exception of a few acres owned by the County, conservation and maintenance or establishment of pre-European vegetation is the primary objective of the public landowners. Recreation is a secondary objective of these owners. Agriculture/Timber lumps together all the privately owned parcels that contain agricultural and timber production as the dominant parcel uses. In many cases, there are multiple zoning classifications for a given parcel that are not spatially delineated or only the general plan designation is given. The agricultural designation encompasses virtually all of the grassland vegetation in the CALVEG2000 data layer, but also includes substantial tree dominated vegetation. Tree dominated vegetation occurs in agricultural, timber, and other classifications and does not allow for any way to spatially allocate timber production areas. The other category consisted of unclassified, forest recreation (Humboldt County), forest lands (Mendocino County) and residential type zoning. These include most of the smaller parcels that were created from larger holdings over the last 30 years. The uses of these properties are varied and often contain permanent or second home residences. Parcel sizes are generally less than one hundred sixty acres, making it unlikely that conventional agriculture or timber production are the primary income source for the owners.

Table 1: General Ownership Categories

	PUBLIC (acres)	AG/TIMBER (acres)	OTHER (acres)
Basin-Wide:	32,890	118,981	37,917
Subbasins			
Northern:	829	59,447	3,278
Western:	26,682	23,807	7,280
Eastern:	2,897	26,584	21,300
Southern:	2,482	9,129	6,059

Within the entire basin, public ownership accounts for 17 percent of the total acreage, agriculture and timber 63 percent, and 20 percent in the other/mixed usage categories. Industrial timberland owners collectively own about 17 percent of the total acreage or about the same amount as held in public hands. The four subbasins differ markedly in their ownership allocations. The Northern subbasin contains very little public land and contains the largest number of acres in agriculture and timber designations. Pacific Lumber Co. owns about 18,000 acres and is actively harvesting in this subbasin. With the exception of the area in and around Petrolia, most of the other land is in large private ownership blocks. The Western subbasin is divided between public land, primarily the king Range National Conservation Area (KRNCA) and non-industrial private landowners. The Eastern subbasin contains a small, but growing amount of public land, much of it acquired from Eel River Sawmills, an industrial timberland owner. Most of this land transfer is not reflected in this database. Of the approximately 5800 acres Eel River Sawmills had when this draft database was developed, only about 600 acres remains in their ownership. Most of the property was transferred to public ownership, but pieces went to other private owners. The Southern subbasin is also undergoing the same pattern of land transfer from private timber production management to non-extractive resource use. Sanctuary Forest is a non-profit organization that holds land specifically for non-extractive and conservation purposes, purchases conservation easements, and coordinates road and land use agreements amongst some of the landowners in the subbasin. The Barnum Timber Co. is the primary industrial landowner in the Southern subbasin. Sierra Pacific, Inc. owns a few thousand acres in the Northern and Eastern subbasins.



California Department of Forestry and Fire Protection - NCWAP - 2002

Figure 3: Ownership Pattern of the Mattole Watershed

The Mattole in pre-European times

When European explorers first gazed upon the Mattole watershed, there were thousands of Native Americans and millions of salmon in Northern California. The native people managed the existing landscape and water resources for their use. There is no indication that they farmed row crops, domesticated livestock or diverted water for crop production. Rather, fire was used extensively to better access native vegetation such as oak trees, reduce oak pests, provide nutritious forage for game, and to provide better visibility and mobility for hunting and gathering.

The first known explorer of the Mattole was John Hill of Fort Humboldt whose 1854 report glowingly described tall clover in the prairies, rich grassland in the valleys, and timbered slopes underlain by wild oats and other grasses (Humboldt Times Weekly, September 23, 1854). Within this report he noted the streams and their riparian corridors of alder, willow, and cottonwood and the Douglas-fir and tan-oak on the slopes. He mistakenly described redwood forests in the nearby woods (W.W. Roscoe, 1940). He also commented on the numerous Indians who appeared to have not seen white men before. This was the only first hand description of the pre-European landscape cited in Elliott's <u>History of Humboldt County, 1881</u>.

W.W. Roscoe provided a series of personal accounts in his self-published monograph, A History of the Mattole Valley, 1940. He recorded this interview of Samuel S. Pollock, one of the first Mattole Valley settlers, in which Mr. Pollock describes the vegetation and condition of the Grange area, about 9 miles upriver of Petrolia.

Pollock said:

"The Mattole Valley was certainly a wonderful sight when I first saw it in the spring of 1857. There were no fences to stop a horseback rider then. I rode my horse all over the valley and right through the tall grass. My horse had hard work to get through the tall grass because it was so badly tangled up. My head would just stick above the grass heads as I sat in my saddle and guided my horse. Every little way a big buck deer or a buck elk, not to mention the little ones, would jump up and run away in the tall grass.

One day I say(sic) three big grizzly bears besides a number of black and brown bears. Gee whiz, weren't those grizzlies independent! They didn't try to hurt me. They just lumbered out of the way, then sat down and looked at me in a curious sort of way. I felt that it would be best not to go too close to them, so I turned my horse to one side and gave them wide berth. Jingoes, how different things look now. I wonder what the teacher and the children of the Upper Mattole School would think now if I could make them realize that their schoolyard and the country around looked like in June 1857, with the tall grass on the flat six or seven feet high, my horse out of sight as I rode, and that big grizzly bear looking at me from the ridge while the deer and the elk were running away. They can't understand it."

W. W. Roscoe later describes the route taken by a group of settlers whose descendants still live in the Humboldt region. It is quoted in its entirety so that one can visualize the wagon train searching its way through ridge-top prairies and open forestlands, then traversing the gravel bed of the main stem of the Mattole.

"Among these settlers to enter the valley in 1868 were Jacob Miner and his four brothers. He was also accompanied by his father, Allen Miner, and by his father-in-law, Charles Johnston, Sr., and the latter's family consisting of several sons and daughters.

The Miners and Johnstons performed what would be considered the almost-impossible feat of bringing a wagon train over the mountain ridges between Blocksburg and Petrolia – and that at a time when no wagon roads existed. After bringing their wagons over the ridges from Blocksburg to the present town of Briceland, they ascended a ridge north of Briceland to what in later years was called the Somerville place on Elk Ridge. From here they descended another ridge through what is now called Crooked Prairie to the Mattole River, reaching that stream not far from where the Ettersburg Post Office now stands. From there they drove their wagons down the Mattole riverbed for several miles to a narrow chasm in the river known since 1875 as the Sterrit Hole. This is the place where Frank Sterrit was drowned in 1875. At this point, the Miner-Johnston wagon train was brought to a stop. How could they get their wagons through that deep, swift-moving pool of water one hundred yards long? At the suggestion of Cyrus Miner, a brother of Jacob, several rafts were constructed and a wagon placed on each one. Cyrus Miner acted as teamster and drove each raft bearing a wagon through the chasm to a flat just north of the famous Sterrit Hole. From there the company proceeded down the river to a point now known as the foot of the Pringle Ridge.

Here, the wagon train was again stalled by boulders, chasms and holes of water in the riverbed. They took their wagons out of the riverbed and ascended a ridge to the north for about one and a half miles, where they paused. From here they descended another ridge, now known to the public as the Abb Ridge, and were again on the Mattole riverbed. From this point they followed the riverbeds and flats for a distance of about six miles to the mouth of a small stream called Pritchett Creek. Their advance scouts again reported that it would be practically impossible to take their wagons through the next two miles of riverbed, owing to the chasms and deep holes of water in the way. Their wagons were accordingly taken out of the riverbed and taken up a ridge on the south side of the river, back of the point where W. E. Roscoe's barn now stands. They halted again about one mile from the river on a ridge just south of where Charles Krill's residence now stands. Here again the company headed its wagons northward, down a ridge known as Hazel Prairie Ridge to a level tract known in after years as the Shinn field, just west of a hill called Kelsey Knob. From here, the train again descended to the riverbed. The wagon train then followed the riverbed and flats for seven miles westward to the town of Petrolia."

It is evident that these people were seeing a landscape that was actively managed by the Indian population. As with other native people, the local tribes practiced burning for a variety of reasons; including brush reduction and prairie maintenance for visibility in hunting, better forage for their game species, and oak woodland management for acorn production (BLM, Mill Creek Watershed Analysis). Driving the native elk from the valley for hunting has also been reported as a reason that the Mattole Indians burned (Miner, 1996). Lightning strikes also ignited fires that were easily spread by the dry summer climate, steep topography, and wind. All of the above descriptions of the Mattole indicate a much more open understory than today that allowed movement of people and wagons in the forests. Site-specific Indian accounts of the use of fire are precluded by the extinction of the tribes due to genocide and disease within ten years of Hill's visit in 1854. Ethnographic descriptions of the local tribes are summarized in both the Bear Creek Watershed Analysis (BLM 1995) and in the Elements of Recovery (ELEMENTS OF RECOVERY 1988).

The Mattole land use characteristics 1858-1940

In 1858, just 4 years after Hill explored the valley, and with the influx of new pioneers, farming began in earnest. The very first settlers were farmers and ranchers who converted native grassland into homesites, home gardens, orchards and rangeland. As grazing activities increased, conversion of the adjoining forests began. Timber was harvested for local needs or simply felled and then areas broadcast burned for conversion.

Original crops included grains, and by 1859 the first threshing machine was brought in. Charles S. Cook came over in 1859, acquired a large land holding 2 miles north of Petrolia and developed it into several thousand acres of stock range. James Dudley established a sawmill and a limited grist mill in 1859. Milton Dudly established a grist mill at the confluence of the Mattole and Squaw creek which remained in operation until about 1900. In the upper Mattole section near Ettersberg, George Hill made wheat growing and flour production a leading agricultural commodity until his death in 1921. While fruit orchards were established as soon as the first settlers arrived, the trees were not productive until 1894, when Albert Etter arrived and ascertained the need for lime. He developed a large farm from virgin forest 8 miles west of Briceland. Extensive apple orchard planting occurred in 1890-1910 and during that time period W. H. Roscoe and other landowners planted nut orchards as well (W.W. Roscoe, c1940).

Petrolia grew rapidly during the short-lived oil boom of 1864-65. Natural gas vents and oil seeping from the ground began a local land rush that almost doubled the Valley population of 282 to over 450 people by 1870 (Elliott). While many land patents were obtained and numerous test wells drilled, there was never a truly commercial volume of oil produced. However, many of the oil seekers remained in the area.

Elliott's 1882 Encyclopedia of Humboldt County noted that the Mattole area produced butter, cheese, wool, beef, mutton and pork. The encyclopedia further states that though the best fruit of the county grows in the Bear River and Mattole districts, the distance to market was too great for commercial production. This theme of distance to market and poor roads is a recurring theme that has stymied rural prosperity in the Mattole (Roscoe, 1977).

Like many North Coast watersheds, there are several Mill Creeks within the basin. However, of the three mill creeks, two refer to grist-mills that made flour for both local use and commercial production until the early 20's. As wheat-raising waned economically, the farms converted to cattle grazing areas. Orchards were planted throughout the Mattole but suffered commercially due to poorly maintained roads (Elliott, 1882). By 1941, established orchards occupied about 142 acres; about half of the acreage was the Etter orchard in the Ettersburg area and the balance in the surrounding area. Dairying and butter making declined as increasing health standards raised the cost of production beyond profitability.

Just after the turn of the century, tannin produced from the bark of tan oak trees became a commercial commodity in the Mattole watershed. The Wagner Leather Company in Briceland processed tan-bark and shipped the solution in barrels to the wharf in Shelter Cove between the years of 1901 and 1922 (Cook 1997). During the boom years, over three thousand cords of bark were processed each year by Wagner Company (Raphael, 1974). The Mattole Lumber Co. in the lower Mattole utilized a one mile rail line which led to a wharf constructed in 1908 at the mouth of the Mattole. The valley's tan oak bark was first hauled out by mule and then transferred to horse and wagon (Clark, 1981). The wharf required constant and expensive maintenance and was not rebuilt after a storm in the winter of 1913/1914. Tan-bark harvesting continued until the supply was depleted in the early 1920's, (Clark, 1981) at about the same time that the tannin extract was replaced by synthetic products.

Cattle were the main livestock raised although during the Depression pigs were set loose and roamed the prairies. Government sponsored predator control programs initiated in the 20's also allowed sheep herds to increase. Grazing practices, frequent burning by ranchers and the introduction of annual, non-native grasses converted the prairie ecosystem from a deep-rooted mat of vegetation to shallow-rooted annual grasslands. Grazing diminished the amount and quantity of the riparian vegetation as well, leading to an overall increase in bare ground.

Timber harvesting prior to World War II was limited. Although there was no splash dam construction on the Mattole, the log mill on Squaw Creek had a twenty-five foot high dam for the log pond (Roscoe, 1991). The redwood headwaters of the Mattole were logged for split and tie products very early in European settlement, but this type of harvesting involved the selection of scattered individual trees that were hand felled and then removed by oxen or bull teams. It is evident that redwood harvesting was in progress in the 1941 photos.

The land rush created by the discovery of oil led to early parcel claim development in the lower parts of the watershed. Settlers claimed most of the area for ranching. Although there were many large ranches, the ownership patterns were primarily individual. The steep brushy part of the Kings range on the western side of the watersheds were publicly owned and while some became private, other parcels were directly transferred into the management of the Bureau of Land Management.

The Mattole land use characteristics after 1940

In 1941, the most widespread use of the watershed appears to have been grazing and is indicated by the amount of grassland and recent fires to be deliberate conversion of pre-existing brush and timberland. Conifer timber harvesting activities are readily apparent near Harris Creek and continue further upstream into the redwood belt. Timber harvest operations began in earnest as Douglas-fir became a merchantable building material during the post World War II boom. The 1952 air photos show the beginning of the large scale timber harvesting era in the Douglas-fir forests of the Mattole watershed. This was the first entry into most of the forest land by mechanized equipment. Harvests were not designed as silvicultural treatments and were an extractive land use. The on-the-ground effects varied from a type of selection or seed tree cut with a large amount of remaining vegetation consisting of unmerchantable conifers, tan-oak, and brush. Many of the harvested areas were burned to reduce slash and inadvertently converted to hardwoods or repeatedly burned for pasture conversion (Blencowe, 1988). The roading was typical of the time period; log landings and access roads were generally at the bottom of the slopes in or adjacent to stream channels.

After 1962, logging operations had slowed. By this time, tractor yarding methods changed to maintain equipment exclusion zones and minimum vegetation retention standards adjacent to watercourses per 1973 Forest Practice Rules. The new forest practice rules limited the cutblock size, creating smaller logged areas. The tax laws also changed, and there was no longer a need to liquidate timber holdings to reduce annual taxes. Most of the timberland had already been harvested once, however, and many of the harvests during this time period were seed tree removal steps and rehabilitation cuts.

Small timberland owners were aware of the understocked conditions of their property and in the 1970s began proposing projects under the California Forest Improvement Project (CFIP) Fund. Project proponents claimed that past practices left stands in poor condition and requested funding for brush removal, hand-planting, pre-commercial thinning, and fire fuel reduction. As a required part of CFIP funding, management plans were also submitted.

By the late 1980s, timber harvesting decreased while environmental awareness increased. Changes in policy concerning management of federal lands and the designation of the Northern Spotted Owl as federally threatened led to the designation of BLM lands, a large proportion of the Western and a smaller percentage of the Eastern subbasins, as Late Successional Reserve (BLM, Bear Creek 1995) lands that are not subject to harvest. In the Eastern subbasin, Eel River sawmill proposed several harvest plans, some in old-growth, which were hotly contested. These lands became part of the effort by some groups, including those formed to influence BLM land use designations and policies on Gilham Butte, to create a “Redwoods to the Sea” wildlife corridor. In the Southern subbasin, increased harvest plans reflect the value of redwood timberlands and efforts to bring previously cut-over lands into greater productivity. The Northern subbasin contains the bulk of Pacific Lumber/Scopac ownership in the Mattole. Although Pacific Lumber is operating under an approved HCP, some of the timber harvesting plans are first entries into old growth, causing protests that include civil disobedience.

Since about 1994, the Mattole has been under an enhanced evaluation policy for timber harvest plan review known as Zero Net Discharge. This has evolved into a site-specific sediment budget approach that balances proposed harvest activities with remedial work on appurtenant or adjacent roads. This is implemented on a THP by THP basis and each plan can and, as new data becomes available, does present a different methodology or at least different values for sediment production in proposed activities. This should be expected because of the site specific evaluation of the proposed project and professional knowledge of cited scientific locations whose values are often accepted or adjusted as a result. A recently approved plan, THP 1-01-052HUM, explicitly illustrates this methodology.

Private non-industrial landowners are concerned about their ability to manage their property for income products such as lifestock and timber. There is fear that sustained low lifestock prices and the cost of additional regulatory requirements will kill the economic viability of this industry. Timber harvesting plan preparation costs and regulatory requirements has also increased. Non-industrial Timber Management Plans (NTMP), established as an alternative permit process in 1991, are not extensively utilized in the Mattole Watershed. Five NTMPs have been approved in the watershed for a total of approximately 1080 acres. Landowners provided a number of reasons for the lack of participation in this program including the following reasons: the maximum acreage is too low, high preparation costs that would require the initial harvest of more timber than the landowner wants to cut, the fear of unanticipated long-term and expensive mitigations required after the major cost of plan preparation, and the fear that future regulations will economically impact previously approved plans. When several landowners were asked how they envisioned their land being managed ten years from now, not one of them knew.

Table 2: Timber Harvest History, Entire Mattole Basin

TIMBER HARVEST HISTORY - ENTIRE WATERSHED*				
	Total Harvested Acres	Total Area Harvested (%)	Average Annual Harvest (ac)	Average Annual Harvest Rate (%)
Harvested ~1945 - 1961**	72,897	38%	4,288	2%
Harvested 1962 - 1974**	21,141	11	1,626	<1
Harvested 1975 - 1983**	6,948	4	772	<1
Harvested 1984 - 1989	3,900	2	650	<1
Harvested 1990 - 1999	8,405	4	840	<1
Harvested 2000 - 2001	1,809	1	905	<1
Not Harvested:				
Grasslands	33,504	18		
Brush and Hardwoods	38,828	20		

* Does not add to 100% due to data discrepancies, re-harvest areas, and uncut timber areas.

** CDF has not yet validated the accuracy of this data (obtained from MRC).

In Table 2, the harvest periods are broken into irregular time intervals as a result of the way existing data was compiled. For the most part, the first period consists of the post-war logging boom although a portion of the southern headwaters were harvested just prior to the 1942 aerial photos. This category includes most of the area harvested and roaded before the 1964 flood which is estimated to be a one hundred year event, meaning that in any given year there is a one percent chance of the stream carrying the same volume of water. Thirty-eight percent of the watershed was harvested during this time period. The harvest period 1964-1974, also prior to the establishment of the first iteration of the Forest Practice rules authorized by the Z'Berg-Nejedly Forest Practice Act of 1973, brought the cumulative total of 49 percent of the watershed area logged by tractor and skidded downhill to log landings and access roads low on the slopes and often adjacent to streams. The next interval, 1975-1983, is a time period of Forest Practice rules prior to substantive watercourse protection. The acres listed in the years 1984-2001 are based on the completion date of timber harvesting plans (THP) and submission dates for non-industrial timber management plans (NTMP) submitted to the California Department of Forestry and Fire

Protection. There were 1,022 acres in NTMP's in the time interval 1990-1999 and 73 acres in 2000-2001. This time period is the most current and harvesting practices reflect increasingly restrictive measures for activities near watercourses. Only about 7 percent of the watershed has been harvested since 1984. These years are broken into intervals that are similar to those used for other analyses in the NCWAP program.

A rough rate of harvest would indicate that from 1945-1961, an average of 2.2 percent of the watershed was harvested per year, from 1962-74, almost one percent, and about one-half percent of the watershed harvested per year from 1984-2001. Much of the watershed is in young stands of trees. As these grow into harvestable size, one could reasonably anticipate an increased rate of harvest on private lands beginning in the next ten to twenty years.

Ranching has focused almost entirely on cattle since the passage of propositions limiting predator control options. County-wide, beef cattle numbers between 1980 and 2001 have ranged between 21,000 to 24,000 head, while sheep numbers have plummeted from 25,000 animals in 1980 to 15,600 animals in 1992 and 4,500 sheep in 1997, the latest figures available (http:/www.nass.usda.gov, 2002). Land holdings in the Mattole are increasingly fragmented and the amount of livestock is difficult to quantify. Many of the smaller ownerships have "hobby" lifestock, but there is no way to estimate numbers. Many members of the community state that much of the current grassland was converted from forestland, often by members of the family. The intensity of grazing seems to have diminished over the decades and there are many areas of brush and young conifer invasion. This is not a reliable indicator of pre-European vegetation conditions since lack of fire can cause the same effect even in native grasslands (Redwood National Park, 1999).

The 1960s were the beginning of the "back to land" movement of young, largely urban people onto subdivided property, generally recently logged. Many of these new residents were interested in learning how to work on their land, to rehabilitate it, and to find an income. Both Honeydew and Petrolia are about 2 hours driving time south of Eureka and provide few business opportunities for employment or shopping. There is heavy use of the Mattole-Briceland road between Whitethorn and Garberville. This is also the designated route to Shelter Cove and to the King Range National Conservation Area. There are some home-based businesses, but many people commute to the Highway 101 corridor in their own vehicles, as no public transportation exists. Local unemployment was estimated at around 50 percent in 1999, but is acknowledged as variable because of seasonal work and an underground economy of marijuana cultivation. In 1999, over half of the elementary students were on a reduced lunch program but the enrollment of approximately 117 students does not include charter school students (www.co.humboldt.ca.us, 2001). There is a strong pride of place amongst many of the local residents that belies bleak and dismal statistics. Current census data indicates that there are at least 1132 people who call the Mattole basin their home.

Factors affecting timber harvest in general

Four key factors appear to have played a deciding role in how timber was harvested along California's North Coast: timber taxation, government regulation beginning with the Forest Practices Act of 1945, the rapid development of logging technology, and timber demand.

The 1943 "Minimum Diameter Law", required timber operators to obtain a permit in order to commercially cut conifers trees of less than 18 inches in diameter (Barbour, Coast Redwood). It was repealed in 1955 (Arvola 1976) The Forest Practices Act of 1945 required that at least 4 seed trees per acre be left for reforestation after harvest. Land owners were required to leave standing timber for reforestation while the land and the standing timber were assessed annually. An "escape" provision in the law allowed a landowner to remove remaining timber from the tax rolls if he cut at least 70 percent of the standing volume. The wood products industry did not have a demand for smaller or minor species conifers and so it was not uncommon to see harvesting for tax purposes that still left a considerable amount of trees on site. The 1976 timber yield tax law taxed timber only when harvested and effectively removed this harvesting incentive from land management. In addition, land could be zoned Timberland Preserve (later amended to Production) Zone or TPZ through a process involving County departments and the landowner. This resulted in a land taxation based on a limited uses enforced by zoning. Other tax laws, including the estate tax, often had a profound impact, especially on private landholdings.

The splash dam logging era consisted of hand felling trees and hooking them to oxen or bull teams that skid the logs down to the stream bottoms. There they were piled up until the winter rains provided enough water that the dams could be tripped, releasing enough water to push the logs downstream to the mill pond. Because of the immense size of the logs and the rudimentary technology, considerable effort was spent in reducing breakage and friction. Lay-outs, consisting of cut brush, limbs, and soft dirt, were constructed to provide a relatively level and soft “bed” for large trees, especially shatter-prone old-growth redwood, to fall upon. Logs were debarked in the woods, fires lit to reduce slash and stream bottoms were smoothed out by cutting vegetation and blasting stumps. Mills were along the mouths of streams so that lumber could be shipped by sea.

Steam donkey logging and railroad transportation systems replaced the splash dam era by the late 1880s. This new technology allowed for and often required the clear-cutting of forests where the cables that linked the steam donkey winches to “spar” trees stretched up to a mile in length. Burning was still used to help reduce the obstacles to moving the logs, but burning was also used to convert the now “worthless” ground into farm and grazing land that was considered a much more productive use of the land. The transportation system generally remained in the creek bottoms although inclines were designed that pulled the train up over dividing ridges as the logging progressed further from the mill sites (Wurm 1986). The mill site locations could be anywhere along the major rail lines and began to be seen further upstream as logging encompassed new areas.

Tractor logging became the principal means of skidding logs to landings after World War II. The caterpillar tractors or “cats” could move around standing trees and allow for the removal of selected trees, resulting in “cut the best and leave the rest”. Lay-out construction time decreased with mechanization and generally incorporated more loose soil than when lay-outs were hand-constructed. Skidding operations moved logs downhill to landings either in swales or ephemeral streams or in close proximity to perennial streams. Most skid trails were a minimum width of 12 feet because this was the blade width of the most commonly used type of bulldozers and were generally 60-75 feet apart because of cable winch line length capacity. On steep slopes, lateral skid trails each resembled roads in the amount of ground disturbance and cut slopes necessary to provide equipment stability. Roads continued to be located down along the streams, often being built directly on top of logging railroad beds. Other ground-based equipment utilized grapples, a pincher-like tong device, instead of winch lines. This often increased production because the machine could move to each individual log but it also increased the potential for ground disturbance and compaction. Since logs were now trucked, logs could be more easily sent to any mill that was able to compete economically.

Cable logging methods using modern skyline systems became quite common after 1972 as the new Forest Practice Rules required soil and stream conservation measures. A combination of production economics, fixed cables in the yarding system, and a move towards reforestation led to the resurgence of clearcutting. Landings and roads were built upslope of the harvest area to accommodate both the rules and new technology. Tractor logging continued upslope of the cable areas on gentler slopes, where site-specific terrain did not allow for cable systems, and where the landowner or logger wanted to minimize costs since tractor logging was and is a less expensive method for timber harvesting than cable systems. The existing road and skid trail systems from the earlier tractor logging days were often abandoned, turned into truck haul roads, or left open by their owners for management access while others were reopened from time to time as the need arose.

Helicopter logging methods have made an occasional appearance in the harvesting of private timberlands. Skidding consists of dropping cable lines through the remaining forest canopy and then lifting logs up and flying them to a landing a short distance away. While soil disturbance is minimized, helicopters are loud and their use is often restricted because of neighbor and wildlife concerns. Landing locations and roads are often a part of the existing network. While the most expensive yarding method, helicopter logging may reduce the cost inherent in building new roads and may reduce road maintenance costs if fewer miles of road are utilized.

Current Vegetation

Vegetation age classes in the Mattole are quite young except for the scattered remaining unentered old-growth stands. These are in protected status where in public ownership. The last stands of old growth in the Northern subbasin are in private ownership and timber harvesting plans there are invariably controversial. The previous harvest and grazing activities moved most stands to an earlier successional stage and as a consequence, hardwoods are now a part of the dominant canopy cover. However, it is clear from aerial photographs from the 1940's that hardwood was a major stand component. Early harvesting activities had a splotchy appearance from small stands and corners being left entirely unentered and other areas having the appearance of an overstory removal which left a substantial amount of vegetation in place. Other areas that are classified as forestland have a low level of livestock grazing. The size and location of mapped grasslands has also changed in response to past activities. Many of the existing grasslands are being encroached by woody vegetation. Studies cited in the draft Redwood Creek Watershed Analysis (RNSP, 1999) suggest a number of causes including a climatic shift towards the currently cooler and moister climate about 2500 to 2800 years ago. While Native American burning practices prior to the arrival of European settlers suppressed the encroachment of Douglas-fir and other woody vegetation, in Redwood Creek the loss of about one-quarter of the prairie and oak woodlands since 1850 is attributed to both fire exclusion and road building (Popenoe et. al. 1992).

The following statistics are based on Calveg 2000 data interpreted from satellite imagery by the United States Forest Service, Remote Sensing Lab. The minimum mapping size is 2.5 acres. The current vegetation is predominately forestland. The mixed conifer and hardwood forest type is a broad category allows for a wide range of coniferous presence in the stand type. The minimum requirement is at least 10 percent conifer and at least 20 percent hardwood. Mixed conifer and hardwood forestland occupy 57 percent of the watershed while hardwood forests occupy 17 percent and coniferous forests occupy another 8 percent. Annual grasslands occupy 15 percent of the watershed. All other vegetation types occupy the remaining three percent of the watershed. With the exception of the estuary and areas where the river broadens out, there are no lakes or other reservoirs that are of sufficient size to map as water at a minimum resolution of 2.5 acres. Half of the watershed is covered by trees that have an average size of 12-24 inches diameter at breast height (DBH). Twenty percent of the area is covered by stands that average greater than 24 inch DBH trees and another 11 percent is covered by pole-sized trees 6-11 inches DBH.

Various broom species (<u>Cystisus sp</u>., <u>Spartium junceum</u>) were visually noted in many disturbed areas, especially around Petrolia and the Mattole Road. Yellow star thistle (Centaurea solstitialus) was not observed and when asked, several ranchers were not aware of its presence in the Mattole. If present, it is at low levels that are not a management issue. Sudden oak death, caused by <u>Phtophthora ramorun</u>, has been reported in Humboldt County, but as of November 2002, there are no occurrences in the Mattole River Watershed.

The mosaic of vegetation that existed prior to the historic land practices of the last 150 years was probably more varied and in smaller patches than now. This hypothesis was tested by BLM as part of the BLM Honeydew Watershed Analysis (1996) when BLM made a comparison of the 1948 vegetation from soil and vegetation maps prepared by the USDA Forest Service and the State of California Division of Forestry using 1947–1948 aerial photography and vegetation data acquired as part of the their analysis project. Their text indicates that of their three subbasins, 90 percent of the Upper Watershed has never been harvested, while Beartrap and the Eastern Watershed were harvested between 1954 and 1966; thus the 1948 vegetation is characteristic of the pristine vegetation for that time period. In 1996, BLM, using the Wildlife Habitat Relationship model as the basis, typed 58 percent of the Upper Watershed as late seral, 18 percent as mid-seral, 22 percent as early seral, and 2 percent as non-forest. The following maps are scanned copies of the 1948 and 1996 BLM maps.

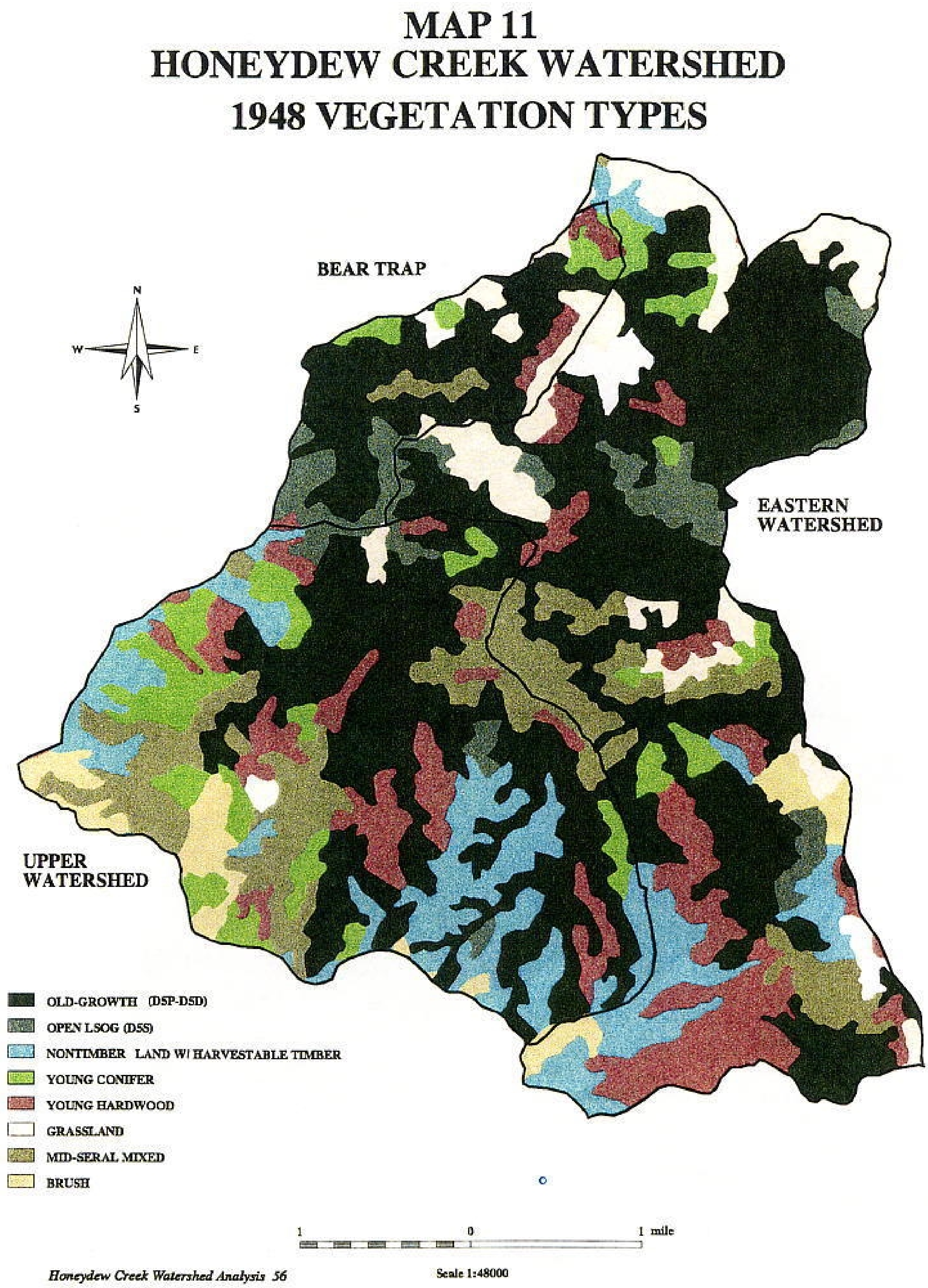


Figure 4: Honeydew Creek Watershed, 1948 Vegetation Types

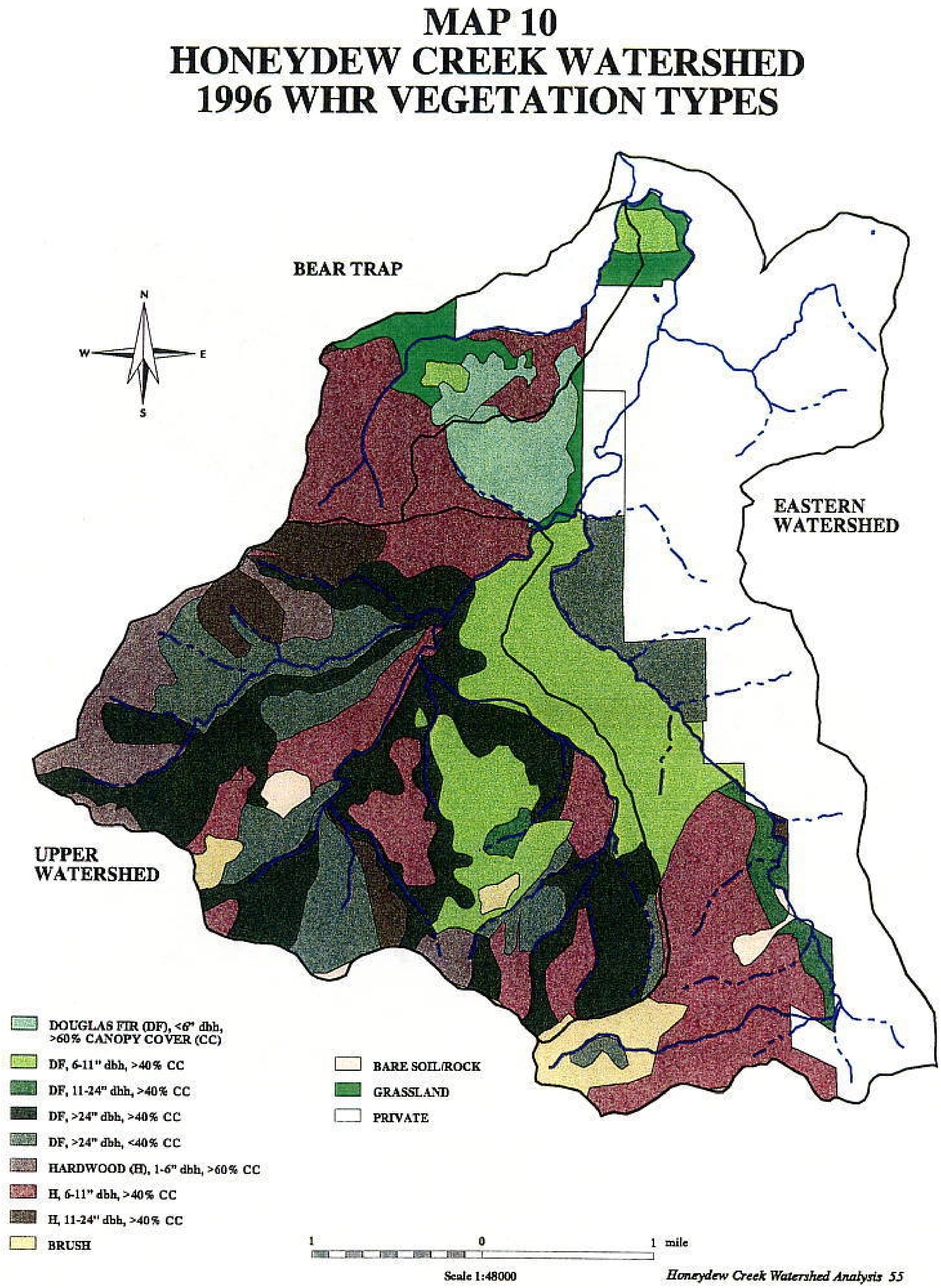
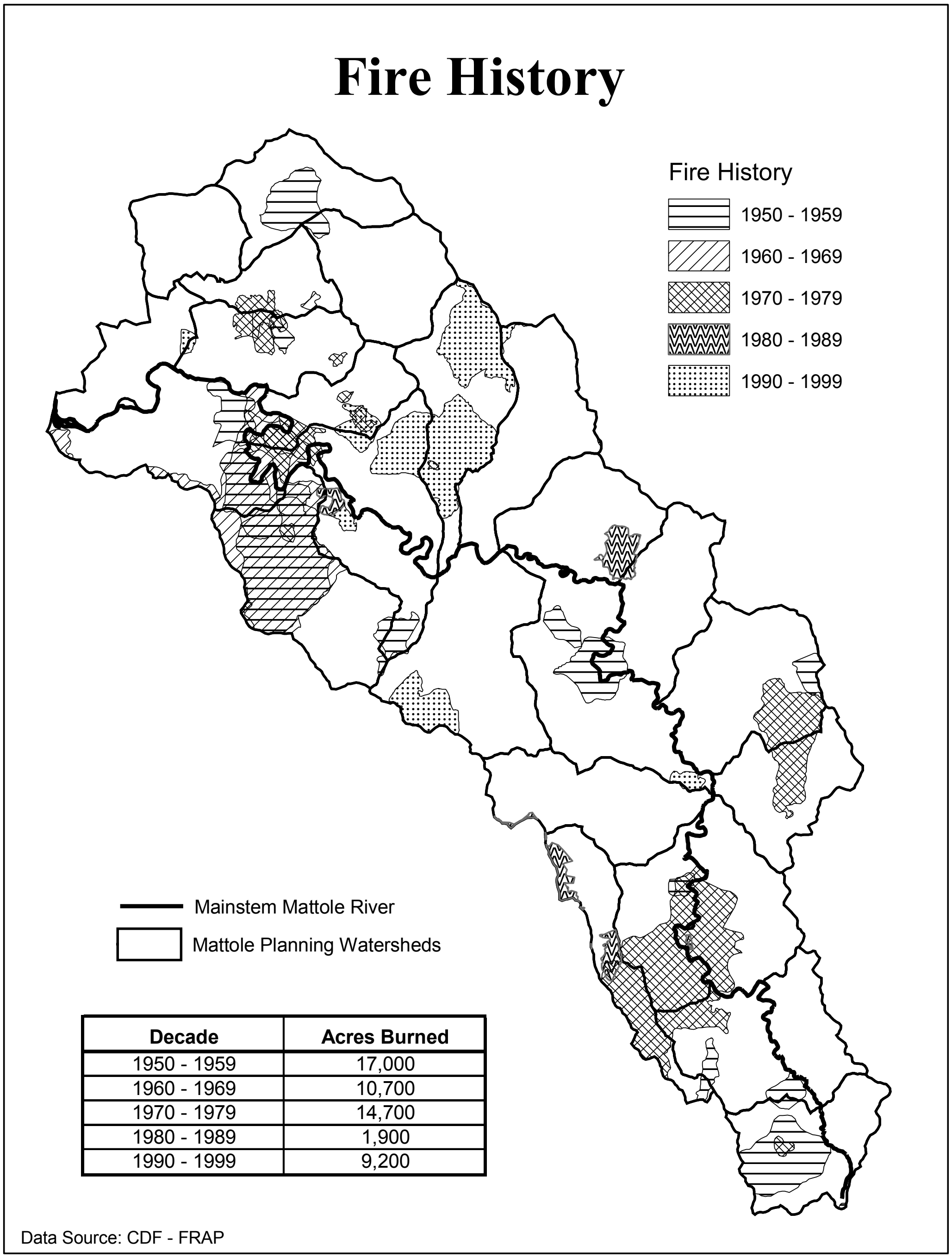


Figure 5: Honeydew Creek Watershed, 1996 WHR Vegetation Types

Current vegetation is the result of fire history in addition to timber harvesting and grazing. As noted earlier, fire was a natural and frequent visitor to the Mattole watershed. Interviews of Honeydew Creek Watershed residents as part of the BLM watershed analysis indicated that many ranchers burned the same areas every two or three years to keep the poison oak and brush down (Anders, 1995). However, active suppression efforts beginning in the 1940's changed the nature of wildfire from frequent, low intensity ground fires to occasional, catastrophic fires. BLM is allowing wildfires to burn in parts of the King Range Conservation Area under carefully monitored conditions (BLM Honeydew 1996). As one issue in their watershed assessment, BLM primarily examined wildfire as a concern for the safety of adjacent landowners, while also acknowledging that stand replacing fires could occur due to the heavy fuel loading in the wildlands. Fires now have the ability to burn through large acreages and to severely damage both upslope and riparian areas, setting back the seral stage. A summer weather pattern of lightning and periods of strong winds, combined with unnaturally high fuel loading may lead to forest stand replacement wildfire as a major upslope contributor to the quality of anadromous fish habitat within the Mattole watershed The towns of Petrolia, Ettersburg, Whitethorn, and Honeydew are all listed in the California Fire Plan as being in a high wildland fire threat area and that some or all of the threat comes from federal lands (http://firesafecouncil.org/fireplanindex.html, May 2002). The Mattole Valley/Prosper Ridge area and the Shelter Cove subdivisions which extend to the watershed boundary are identified in the CDF Humboldt/Del Norte Ranger Unit Fire Management Plan as being two of the highest risk areas in the County. A fire risk and fuels model for Humboldt County is being prepared for release at the end 2002. This same report notes that some of the largest fires have occurred in the area and suggests that there is a microclimate that provides the potential for the occurrence of extreme fire behavior (CDF, 2002).

Protection of these communities and dispersed rural residences are the focus of local fire safe councils. The Lower Mattole Fire Safe Council recently released a draft local fire plan that emphasizes strategies for the protection of people and structures, but also describes biological priorities for each of the eight local neighborhood areas. Keeping wildfire out of existing old-growth forest stands and specific riparian areas constituted the bulk of the recommendations while the report also acknowledges that some State and Federal areas are currently developing management plans (http://www.mattole.org/pdf/MRCFIREPLAN.pdf). Grazed grasslands may play a role as managed fire breaks and also provide emergency access. (R. Stansberry, pers. Com).

The following map and associated table displays wildfires over 300 acres in size and CDF-managed prescribed burns of any size. It does not include site preparation burns after timber harvesting or non-agency sponsored prescribed burning of grasslands by ranchers.



Decade	Acres Burned
1950 - 1959	17,000
1960 - 1969	10,700
1970 - 1979	14,700
1980 - 1989	1,900
1990 - 1999	9,200

California Department of Forestry and Fire Protection - NCWAP - 2002

Figure 6: Mattole Watershed Fire History

Roads

Roads in the Mattole Basin were originally wagon road transportation routes in and out of the watershed that evolved to become County roads. Additional roads were built to access ranchland for grazing but were a minor feature on the landscape. With the post-war boom and increased logging, roads were built hurriedly and poorly. The pattern of huge numbers of roads near and in most forested streams, steep slope downhill tractor logging, and the subsequent abandonment of miles and miles of roads and skid trails to the erosional force of the elements is a common North Coast theme which was repeated here. The Mattole may have suffered more than most watersheds because such a large percentage of the watershed was logged in the same time period as the two major flood events in 1955 and 1964. Roads have been acknowledged as a major source of human-caused sediment in managed watersheds such as the Mattole (Gucinski, H., M.J. Furniss, R.R. Ziemer, M.H. Brookes, editors. 2001.). While timber harvesting activities accounted for the construction of most of roads, many roads are now abandoned or function as driveways to permanent or seasonal home sites.

The Mattole Road and the Briceland–Thorn Roads are paved county roads that lie in close proximity to the Mattole River itself. The confluences of the main tributaries: the North Fork, Honeydew Creek, and the Lower North Fork, also have county road junctions with short rural residential access type roads. Humboldt County is currently engaged in an aggressive roads program that is assessing, evaluating, and implementing projects that include paving, re-aligning drainage-structures to reduce road-related erosion, and replacing fish barriers. Humboldt County is working within the 5 Counties Restoration Effort in order to develop consistency and efficiency for their evaluations, as an information sharing group, and as a mechanism to propose and implement projects and allocate funding from federal and state sources.

Numerous other road assessments have been undertaken within the last ten years. Programs are underway to evaluate and properly repair and abandon roads and to educate the numerous small landowners on effective ways to maintain their driveways. The Bureau of Land Management has implemented a roads program that includes prioritization of road abandonment locations and abandonment work. Current and potential sediment production from abandoned inner gorge roads and their stream crossings is thought to be relatively low in the Honeydew and Bear Gulch because they have already failed during past floods and the road prisms left are stabilizing with vegetation growing on them (NRM 1996; ELEMENTS OF RECOVERY 1989). In the Thompson Creek watershed, a recent roads survey contracted by Sanctuary Forest found substantial amounts of road-related material which could be mobilized during storm events and delivered into streams (PWA, 2001) Barnum Timber Company completed an assessment on their lands and Pacific Lumber Co. has an active roads management program that evaluates and upgrades roads ownership-wide. The Mattole Restoration Council, a locally based watershed group, is a strong advocate of a collaborative effort called the Mattole Good Roads, Clear Creeks Program that coordinates assessments by stream tributary for willing landowners. Problem sites can be prioritized at a watershed scale for treatment as funding becomes available (Larson, 2001).

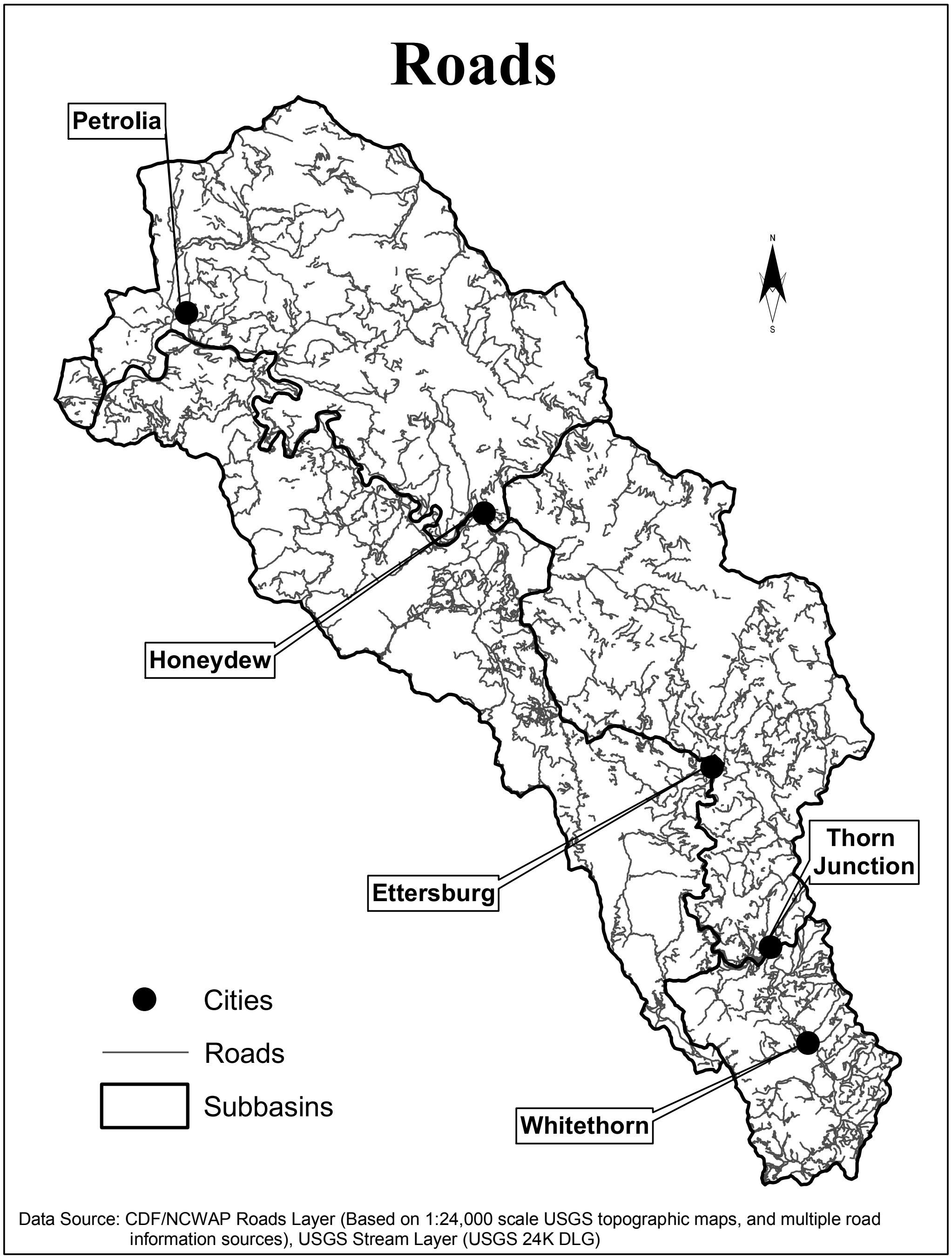
Several GIS road layers that covered portions of the Mattole Watershed were obtained and evaluated. All varied in the type of information gathered and tabulated. Some included abandoned roads, others, skid trails, and some only currently utilized roads. Some site specific information was withheld because of confidentiality concerns and the fear that the information would be used against the landowner without further investigation as to cause. It is assumed that mapping accuracy varies since global position system (GPS) data has become increasingly accurate over the last decade. Due to the large number of individual landowners, it is clear that compiling an up-to-date roads layer that provides more than location information will be a challenge, especially since a number of road rehabilitation projects are underway. These roads layers were blended with the existing CDF Roads layer to form a new GIS data set for analysis for the Mattole watershed. Additional roads information may be available as part of the Total

Maximum Daily Load (TMDL) assessment for the Mattole watershed. The anticipated release date is late 2002.

The data used for the EMDS model is a newly developed roads layer that joined all existing data and added roads seen on 1993 USGS orthographic aerial photographs. Road densities increased as compared to previously available data sets. For example, a road density of 5 miles/sq. mile was reported for the 11,001 acre Honeydew watershed (BLM 1996) and 9.1 miles of road/sq. mile in the 1336 acre Mill Creek watershed (BLM 2001). The reported road density in the Upper Mattole, mapped as the Thompson Creek planning watershed and some contiguous acreage of the Bridge Creek planning watershed, is approximately 6.2 miles of road/sq. mi, over half of it constructed before 1959 (PWA, 2001). However, these and other available roads coverages each augment only one or part of one planning watershed and when added to the CDF base layer make it appear that some watersheds are more impaired due to road mileage estimates than others solely as a result of more information.

Table 3: Road Mileage and Density

Roads			
	Miles (of road)	**Acres (of land)**	**Road Density (miles per sq. mile)**
Basin-wide:	1,263	189,817	4.2
Northern Subbasin:	356	63,557	3.5
Western Subbasin:	400	57,870	4.4
Eastern Subbasin:	329	50,774	4.1
Southern Subbasin:	179	17,615	6.5



California Department of Forestry and Fire Protection - NCWAP - 2002

Figure 7: Roads in the Mattole Watershed

Northern Subbasin

Calwater planning watersheds: Joel Flat, Long Ridge, Apple Tree, Rainbow, Petrolia, Cow Pasture Opening, McGinnis, Oil Creek, Rattlesnake, Camp Mattole.

Vegetation

Unless otherwise noted, the vegetation description in this section is based on manipulation of Calveg 2000 data. This is vegetation data interpreted from satellite imagery by the United States Forest Service, Remote Sensing Lab. The minimum mapping size is 2.5 acres.

Occupying 31 percent of the northern subbasin, there is more grassland in this subbasin than in any of the others (Figure 12). Mixed hardwood and conifer forests cover 44 percent of the area, conifer forest 11 percent, and hardwood forest 12 percent for a total of sixty-seven percent forested area. The forested vegetation reflects the impacts of harvesting and wildfire. Two fires in 1990 covered 6700 acres, mostly in the Oil Creek and Camp Mattole planning watersheds. Forty percent of the Northern subbasin is in the 12 to 23.9 inch diameter breast height (dbh) size class. Only seven percent of the forest stands have average tree diameters greater than twenty-four inches. The largest percentage of forest stands with an average diameter greater than 24 inches dbh are in the Long Ridge planning watershed. Long Ridge also contains the largest contiguous stand size of trees in this size class. Not all stands greater than 24 inches dbh are old-growth forest and specific areas were not identified as old-growth stands within this report. Shrub, barren, agricultural lands, and urban classifications together cover the remaining 2 percent of the area.

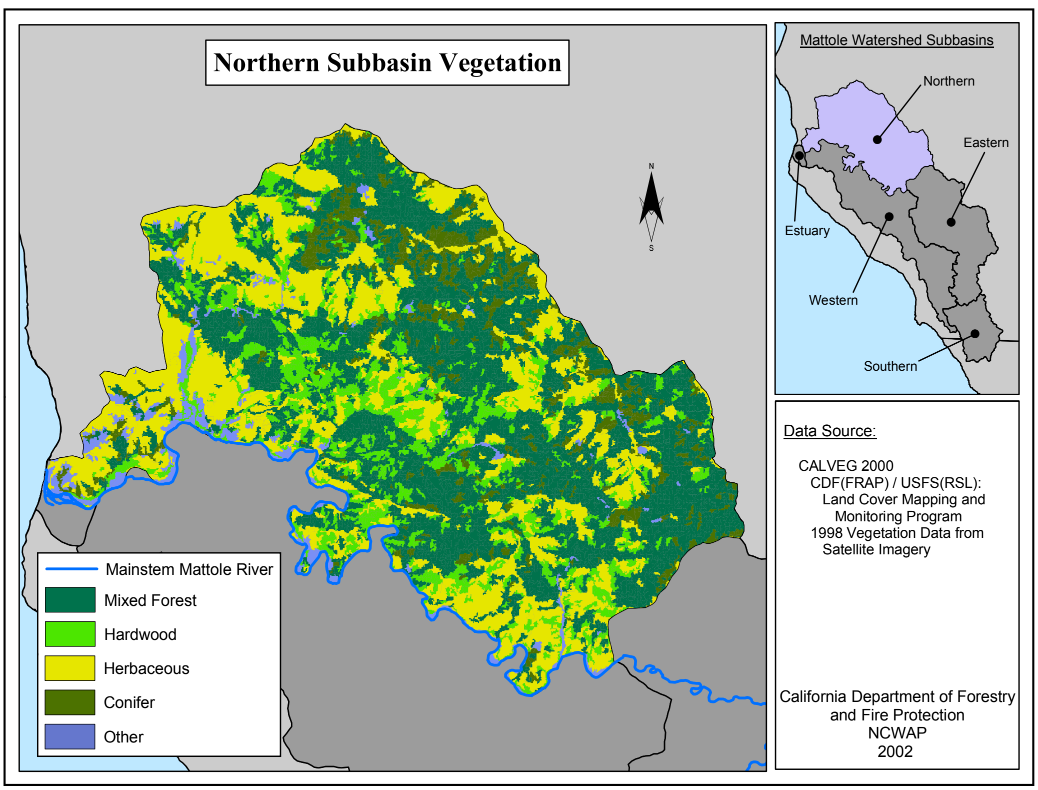


Figure 8: Vegetation of the Northern Subbasin

Ownership

Census 2000 data indicates that 200 people have their permanent residence in this subbasin, many of them in and surrounding the town of Petrolia. Grazing and timber management are the major land use activities. Grazing activity is primarily on non-irrigated natural grasslands. The 1941 aerial photographs show widespread indications of grazing and written accounts make it clear that Petrolia and the surrounding grasslands have influenced the local landscape since settlement in the 1860s. This subbasin contains the largest blocks of ownership in private hands, including Pacific Lumber (~18,000 acres) as the major industrial timberland owner. Timber harvesting since 1983 has occurred on a small percentage of the subbasin, almost entirely on industrial timberland.

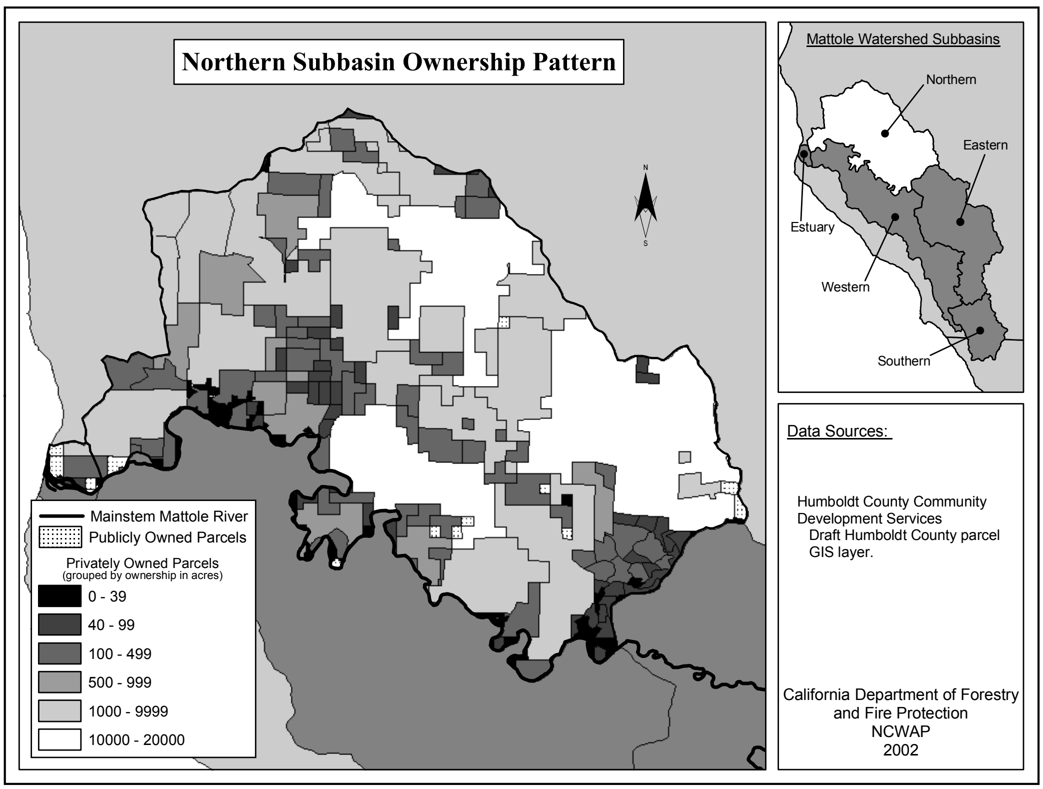


Figure 9: Ownership Pattern of the Northern Subbasin

Land Use

Timber harvesting covered a substantial portion of the basin prior to the 1964 flood. Aerial photograph interpretation of 1941 flights show the main activity appears to be maintenance of grassland and conversion of forestland to grassland. Fire activity was the dominant land disturbance on 3900 acres, most of it appearing to be related to conversion and often standing dead trees were present while there was no indication of skid trails for harvesting. Timber removal was the predominant activity on about 750 acres in the 1941 aerial photos and while tractor skidding was the main harvest method, in many cases it is not clear how logs were removed or if they had been burned in place. In the 1954 aerial photographs, the predominant land use disturbance for 2600 acres was fire, primarily as a tool for conversion to grassland. Timber harvesting activity encompassed about 4700 acres, all but a few acres tractor skidded. The silviculture was a type of seed tree cut that often left brush and some conifer. Timber harvesting activity since 1983 has covered about 10 percent of the subbasin. One area of locally intensive harvest, in the Oil Creek planning watershed, was a sanitation/salvage harvest following the 1990 Rainbow wildfire. Since 1983, there is still a large percentage of tractor logging by area. The silvicultural systems appear to be based on the uneven nature of the stands that were left after the first entries and primarily consist of even-aged regeneration methods. About one-fifth of the acres have had a commercial thin or selection treatment. There are no NTMPs in this subbasin. Pacific Lumber Co. (PALCO) anticipates harvesting 900 acres of late successional forest stands within the Bear-Mattole WAA (of which the Mattole Northern Subbasin is a part) in the first decade of the PALCO HCP/SYP (THP 1-99-336 HUM). These late successional forest stands are identified as providing habitat for old-growth dependent species and may or may not include unentered timber stands over 200 years of age. This definition and their map are site-specific and based on intensive inventories that cannot be correlated to the largest size class distribution of the CalVeg2000 data layer. Harvesting in these types of stands has caused protests, including civil disobedience.

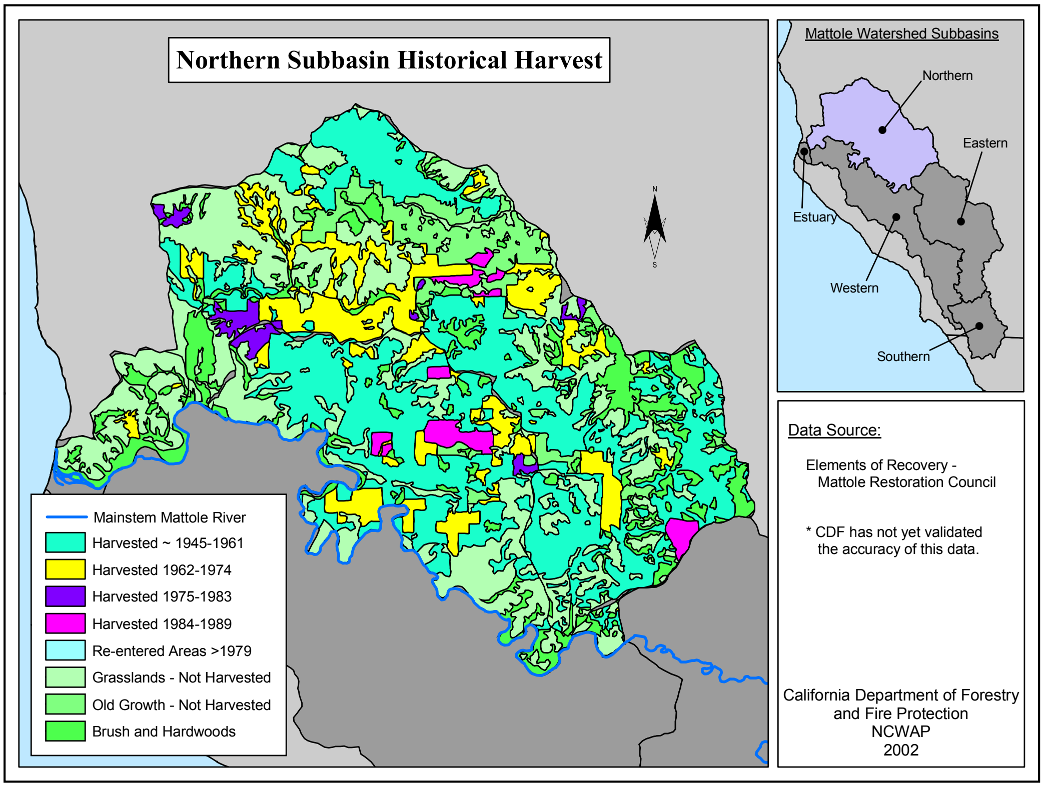


Figure 10: Timber Harvest History of the Northern Subbasin

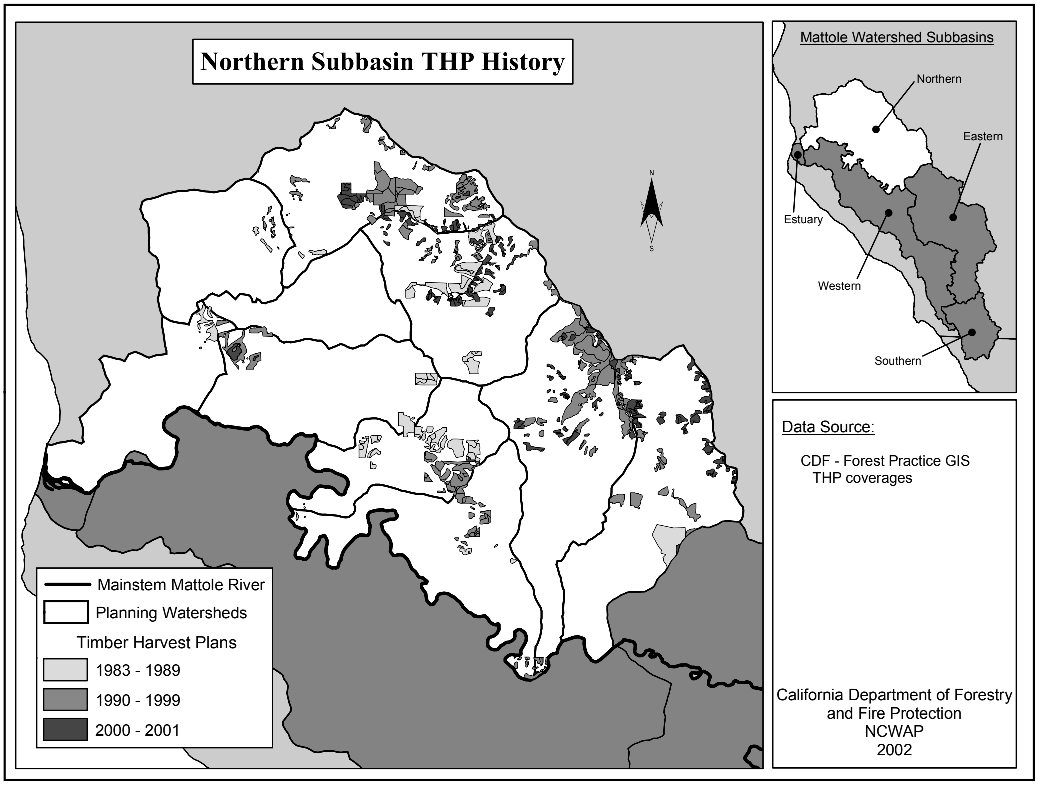


Figure 11: Timber Harvesting Plans 1983-2001, Northern Subbasin

Table 4: Timber Harvest History, Northern Subbasin

TIMBER HARVEST HISTORY - NORTHERN SUBBASIN*				
	Total Harvested Acres	Total Area Harvested (%)	Average Annual Harvest (ac)	Annual Harvest Rate (%)
Harvested ~1945 - 1961**	21,555	34%	1,268	2%
Harvested 1962 - 1974**	7,675	12	590	1
Harvested 1975 - 1983**	968	2	108	<1
Harvested 1984 - 1989	1,291	2	215	<1
Harvested 1990 - 1999	3,364	5	336	<1
Harvested 2000 - 2001	1,281	2	641	1
Not Harvested:				
Grasslands	19,479	31		
Brush and Hardwoods	8,194	13		

* Does not add to 100% due to data discrepancies, re-harvest areas, and uncut timber areas.

** CDF has not yet validated the accuracy of this data (obtained from MRC).

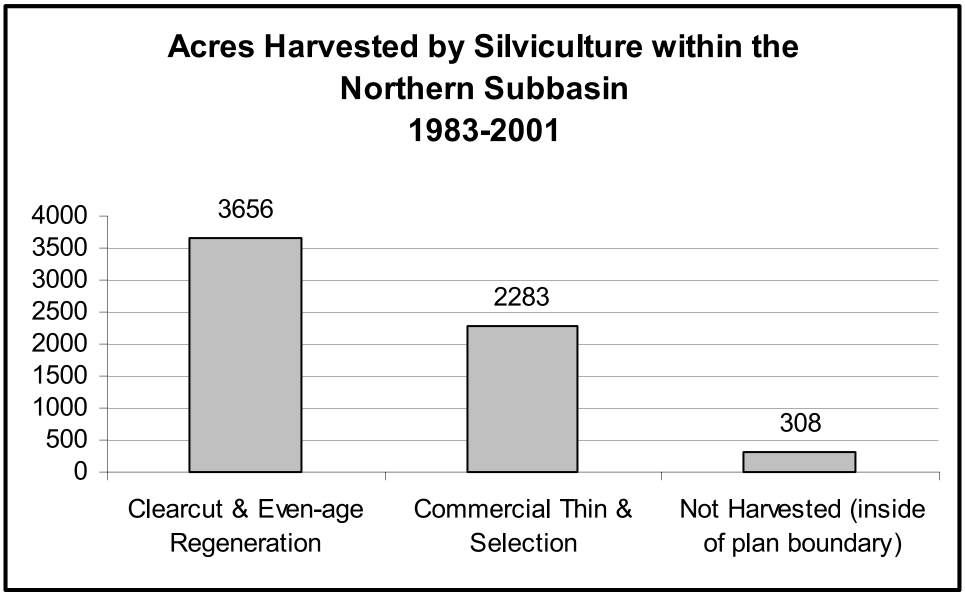


Figure 12: Silvicultural Systems, Northern Subbasin

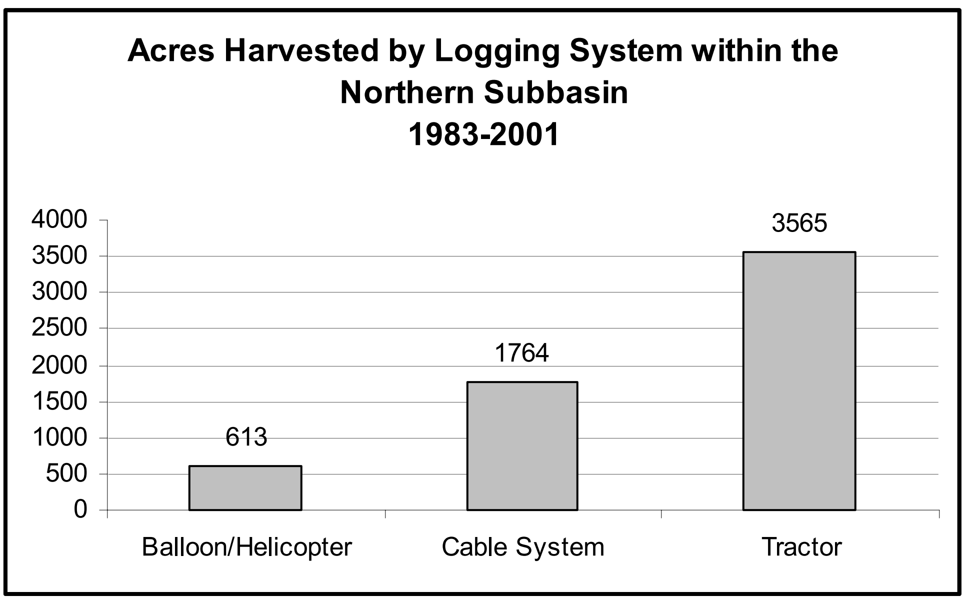


Figure 13: Logging Systems, Northern Subbasin

Riparian Conditions

Unless otherwise noted, the vegetation description in this section is based on manipulation of Calveg 2000 data. This is vegetation data interpreted from satellite imagery by the United States Forest Service, Remote Sensing Lab. The minimum mapping size is 2.5 acres.

Vegetation within 150 feet of the centerline of streams is 53 percent mixed conifer and hardwood forest, 17 percent hardwood, 10 percent conifer forest, 10 percent annual grassland and 7 percent barren while shrubs, water, agricultural and urban combined make up the remaining 3 percent. Riparian hardwood plant communities occupy only 2 percent of this near-stream area while hardwood-dominated timber sites in this zone occupy 1.5 percent of the area. The large percentage of barren occurs primarily along the Mattole River and the lower reaches of the Lower and Upper North Forks of the Mattole River. The area occupied by this single-width zone is 12 percent of the total Northern Subbasin acreage.

Visual observation along the County Roads adjacent to the Mattole River and the downstream reaches of the North Fork and the Lower North Fork indicates that the riparian area is often restricted and defined by the location of these roads. The grassland component is mainly adjacent to upslope grassland. In aerial photos it can be seen that while there are a tremendous number of springs originating near the ridgetops, some of which have definite channels and narrow riparian strips connecting to the stream systems, many tributaries in the grassland lack riparian vegetation. Hardwood-dominated timber site is a classification that categorizes the area as a commercial timber site that has been converted to a vegetation type that no longer contains conifers.

Eastern Subbasin

Calwater planning watersheds: Dry Creek, Sholes Creek, Westlund Creek, Mattole Canyon, Blue Slide, Eubank Creek.

Vegetation

Unless otherwise noted, the vegetation description in this section is based on manipulation of Calveg 2000 data. This is vegetation data interpreted from satellite imagery by the United States Forest Service, Remote Sensing Lab. The minimum mapping size is 2.5 acres.

Mixed hardwood and conifer forests cover 64 percent of the area, conifer forest 9 percent, and hardwood forest 16 percent for a total of eighty-nine percent forested area. Grassland occupies 11 percent of the subbasin. Shrub, barren, agricultural lands, and urban classifications together cover the remaining 2 percent of the area. The forested vegetation reflects the impacts of harvesting. Fifty-six percent of the Eastern subbasin is in the 12 to 23.9 inch diameter breast height (dbh) size class. Twenty-one percent is in a diameter size class greater than 24 inches diameter breast height.

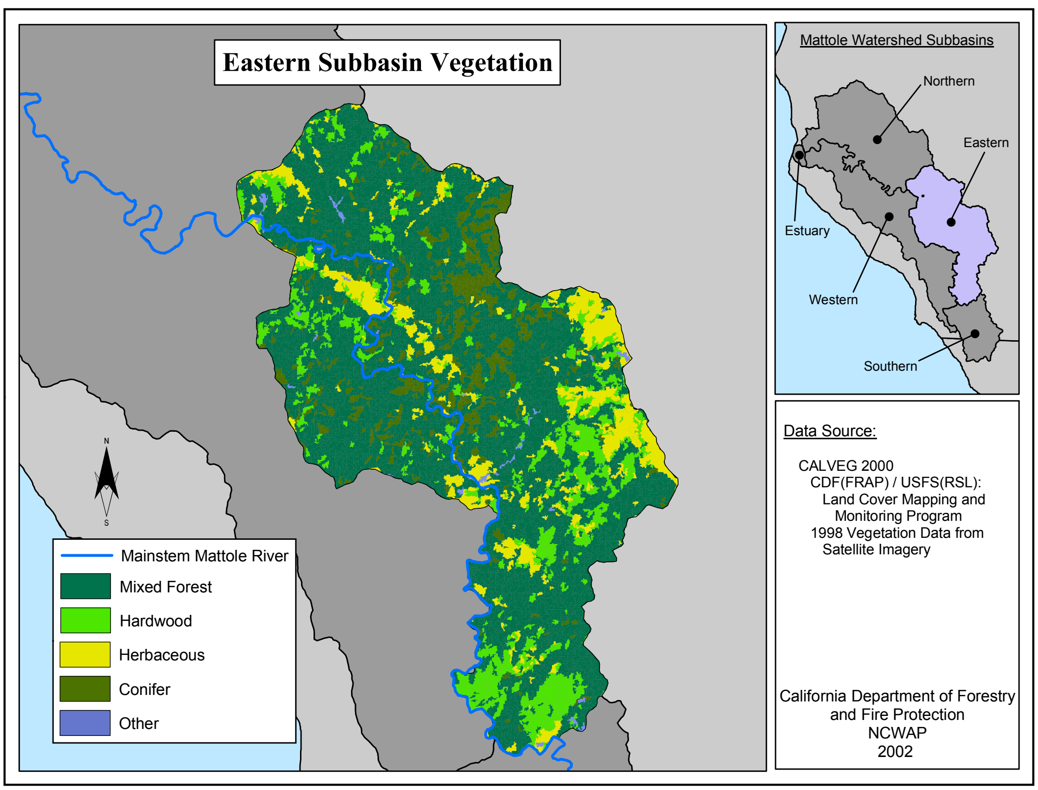


Figure 14: Vegetation of the Eastern Subbasin

Ownership

The watershed is largely subdivided into rural homesteads. Census 2000 data indicates that about 200 people are permanent residents. The town of Honeydew is located near the downstream end of this subbasin near the confluence of Honeydew Creek and the Mattole River. This subbasin includes the Sholes Creek planning watershed on the west side of the Mattole River because the Wilder Ridge Road climbs onto the ridge boundary.

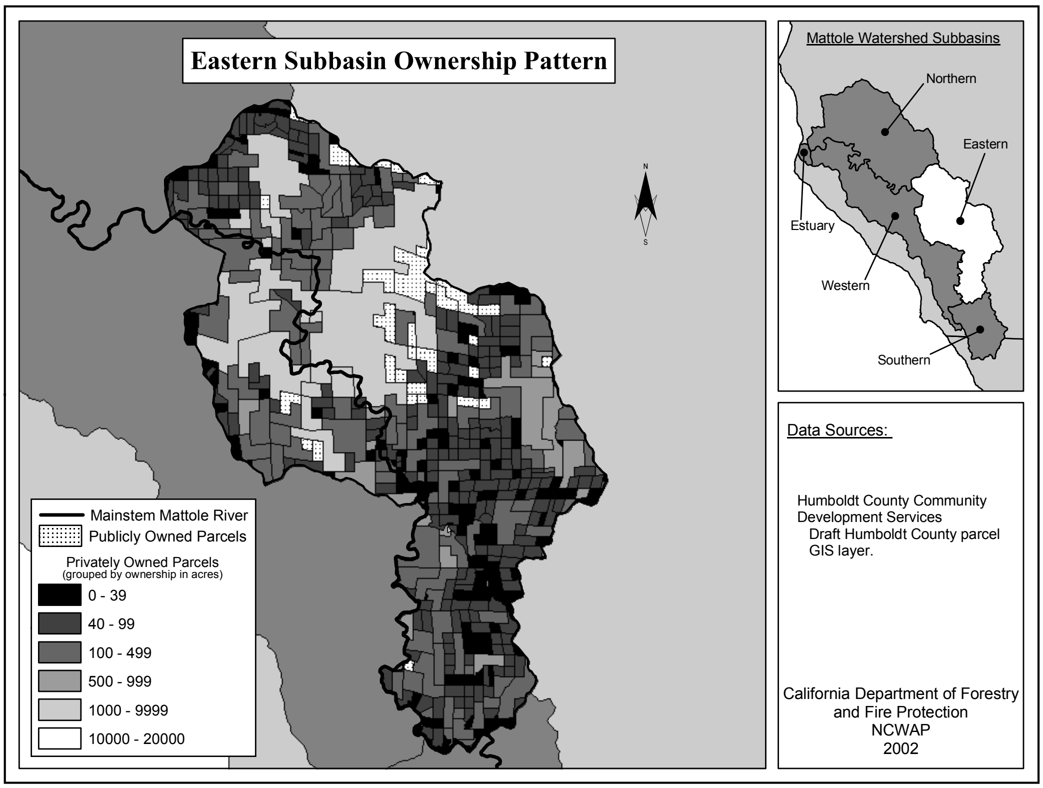


Figure 15: Ownership Pattern of the Eastern Subbasin

Land Use

Timber harvesting covered a substantial portion of the basin prior to the 1964 flood. Aerial photograph interpretation of 1941 and 1952 flights show the main activity appears to be maintenance of grassland and conversion of forestland to grassland. In many cases, this was by use of fire and often standing dead trees were present while there was no indication of skid trails for harvesting. Fire activity was the dominant land disturbance on 4,500 acres, most of it appearing to be related to conversion and often standing dead trees were present while there was no indication of skid trails for harvesting. Timber removal as the predominant activity occurred on only 48 acres in the 1941 aerial photos. In the 1954 aerial photographs, the predominant land use disturbance switched to timber harvesting for a total of 10,760 acres. Fire activity was 1480 acres. The silviculture was a type of seed tree cut that often left brush and some conifer. Later, as timber harvesting occurred, the logging method was tractor logging down to streamside road systems. The silviculture was a type of seed tree cut that often left brush and some conifer. Timber harvesting activity since 1983 has covered about 5 percent of the subbasin. Almost all of the acreage harvested utilized an even-aged silvicultural method, including the shelterwood removal step. About eighty percent of the harvested area was tractor logged. NTMPs are approved on 474 acres. The silvicultural system is selection using the tractor logging system for all 474 acres.

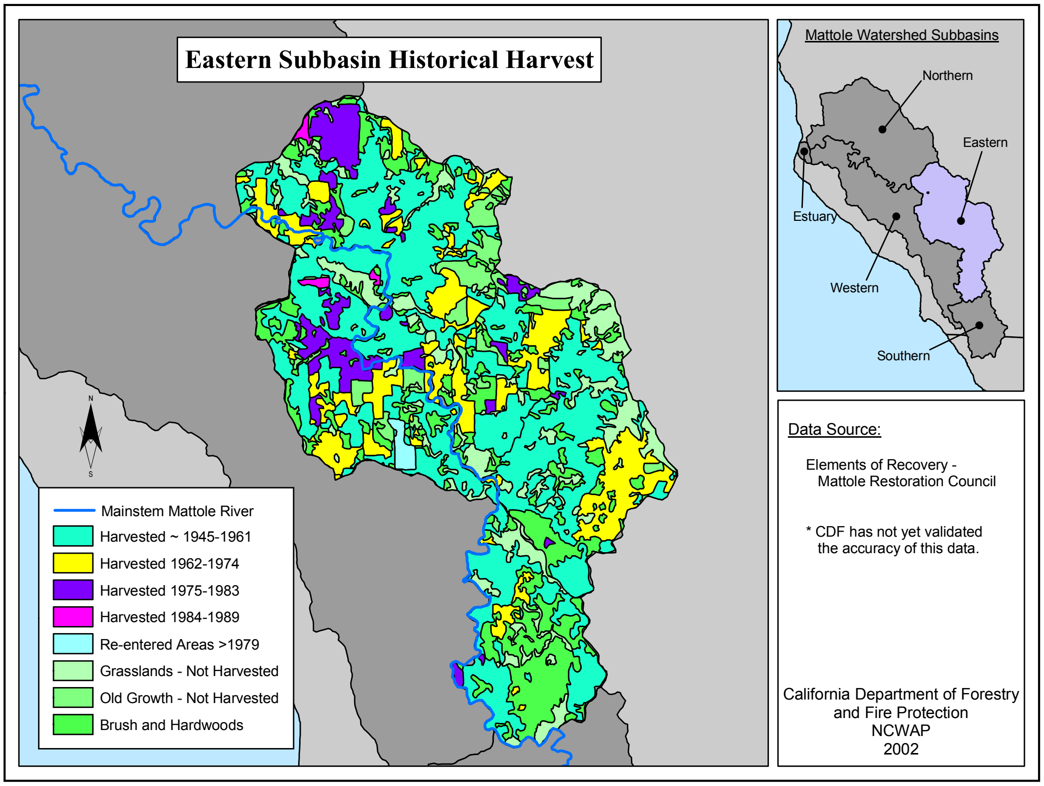


Figure 16: Timber Harvest History of the Eastern Subbasin

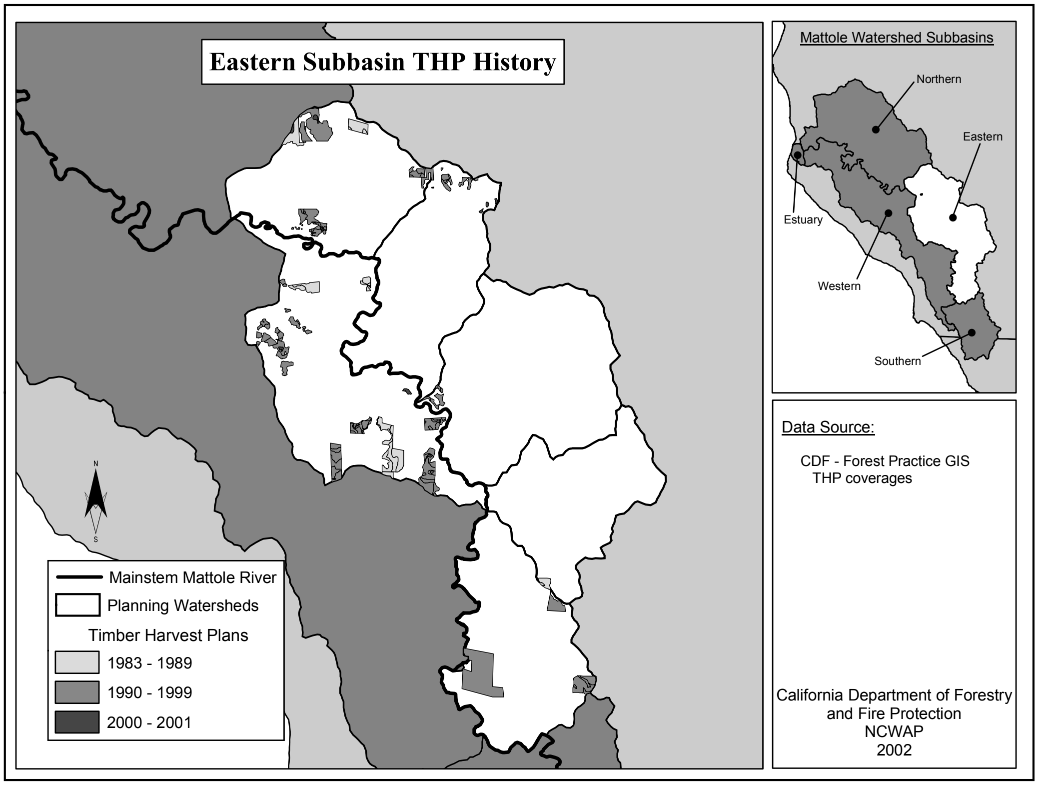


Figure 17: Timber Harvesting Plans 1983-2001, Eastern Subbasin

Table 5: Timber Harvest History, Eastern Subbasin

TIMBER HARVEST HISTORY - EASTERN SUBBASIN*				
	Total Harvested Acres	Total Area Harvested (%)	Average Annual Harvest (ac)	Annual Harvest Rate (%)
Harvested ~1945 - 1961**	21,431	42%	1,261	2%
Harvested 1962 - 1974**	7,639	15	588	1
Harvested 1975 - 1983**	3,288	7	365	<1
Harvested 1984 - 1989	554	1	92	<1
Harvested 1990 - 1999	2,010	4	201	<1
Harvested 2000 - 2001	47	<1	24	<1
Not Harvested:				
Grasslands	6,223	12		
Brush and Hardwoods	9,260	18		

* Does not add to 100% due to data discrepancies, re-harvest areas, and uncut timber areas.

** CDF has not yet validated the accuracy of this data (obtained from MRC).

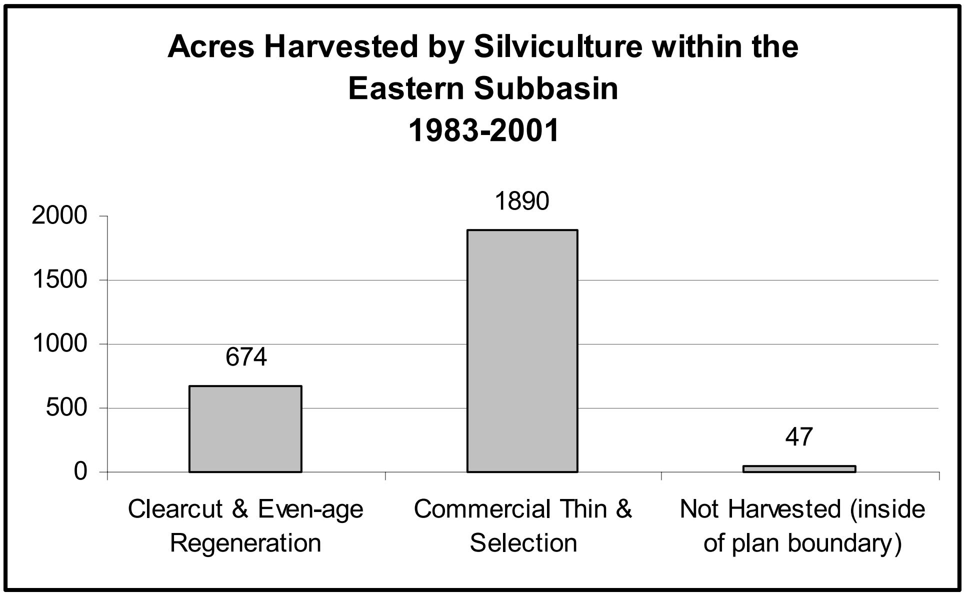


Figure 18: Silvicultural Systems, Eastern Subbasin

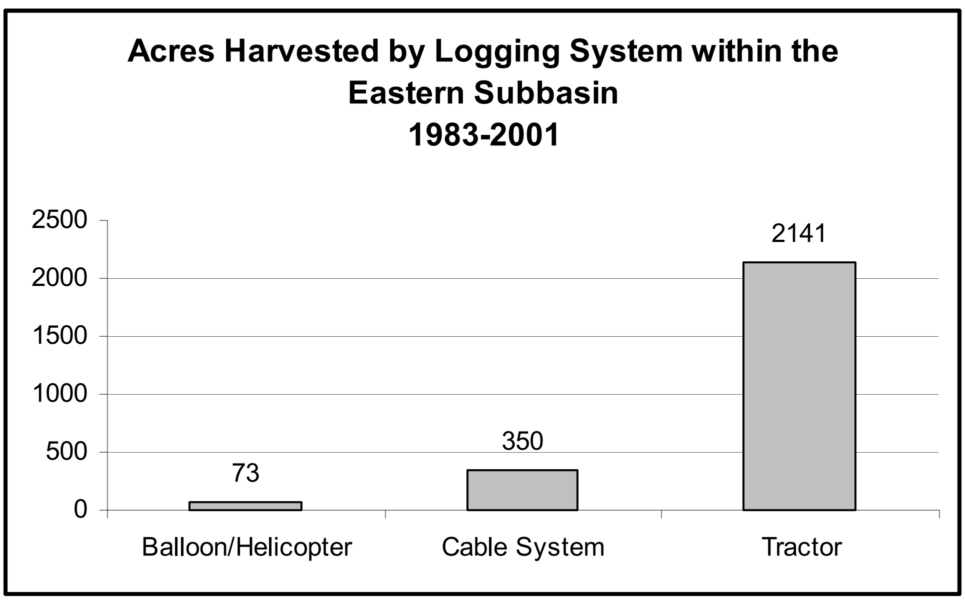


Figure 19: Logging Systems, Eastern Subbasin

Riparian Conditions

Unless otherwise noted, the vegetation description in this section is based on manipulation of Calveg 2000 data. This is vegetation data interpreted from satellite imagery by the United States Forest Service, Remote Sensing Lab. The minimum mapping size is 2.5 acres.

Vegetation within 150 feet of the centerline of streams is 70 percent mixed conifer and hardwood forest, 11 percent hardwood, 9 percent conifer forest, 4 percent annual grassland and 5 percent barren while shrubs, water, agricultural and urban combined make up the remaining 1 percent. The large percentage of barren occurs primarily along the Mattole River downstream of the confluence of Mattole Canyon and the Mattole River, the downstream portion of Mattole Canyon and in Dry Creek. Fifty-eight percent of the riparian area is covered by trees in the 12 to 23.5 inch diameter size class. The area occupied by this single-width zone is 13 percent of the total Eastern Subbasin acreage.

The majority of the riparian vegetation in this subbasin in the small to medium tree sizes. As with other watersheds, this generally reflects past harvest history. The Westlund Creek planning watershed has had almost no timber harvesting since 1983. Sholes Creek, on the other hand, has had the largest percentage of post 1983 harvesting for the subbasin.

Southern Subbasin

Calwater planning watersheds: Bridge Creek, Thompson Creek.

Vegetation

Unless otherwise noted, the vegetation description in this section is based on manipulation of Calveg 2000 data. This is vegetation data interpreted from satellite imagery by the United States Forest Service, Remote Sensing Lab. The minimum mapping size is 2.5 acres.

Mixed hardwood and conifer forests cover 70 percent of the area, conifer forest 4 percent, and hardwood forest 23 percent for a total of ninety-five percent forested area. Approximately 13 percent of the area contains a redwood component along the lower elevations near watercourses. Grassland occupies 4 percent of the subbasin. Shrub, barren, agricultural lands, and urban classifications together cover the less than 1 percent of the area. The forested vegetation reflects the impacts of harvesting. Sixty-three percent of the Southern subbasin is in the 12 to 23.9 inch diameter breast height (dbh) size class. Twenty-two percent is in a diameter size class greater than 24 inches diameter breast height.

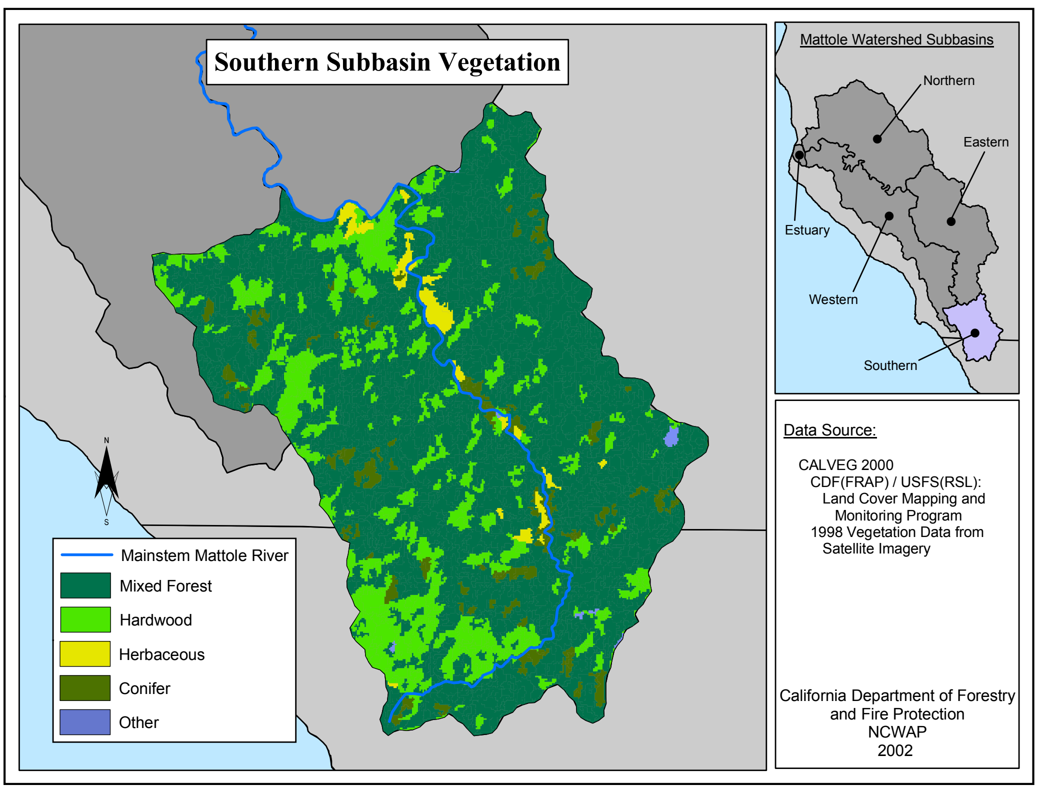


Figure 20: Vegetation of the Southern Subbasin

Ownership

Census 2000 figures indicate that 206 people call this subbasin their permanent residence. Much of the watershed is subdivided into small parcels and is the most densely populated subbasin of the Mattole. About half of the watershed is managed for timber and is unique to the Mattole as a redwood production zone. The eastern portion of the subbasin contains the bulk of the industrial timberland. Sanctuary Forest, a non-profit land trust located in this subbasin is active in the purchase of land and protective easements here in the Mattole headwaters. Many of the landowners are engaged in a cooperative land-use and roads program.

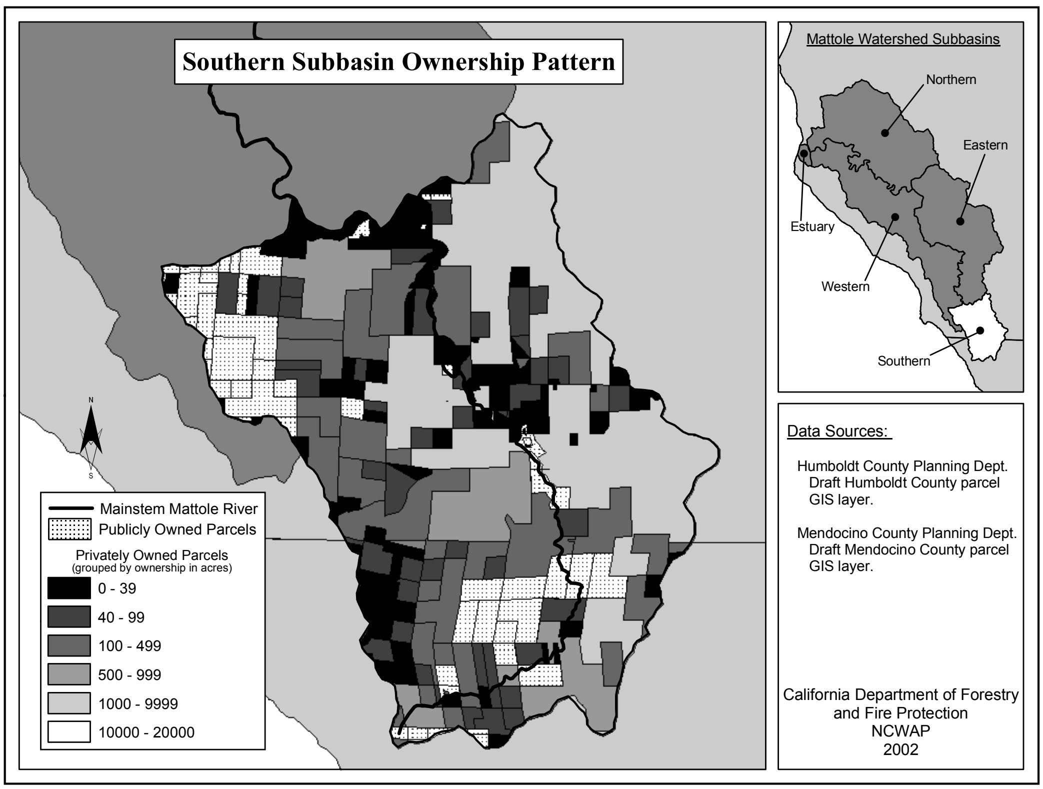


Figure 21: Ownership Pattern of the Southern Subbasin

Land Use

Timber harvesting covered a substantial portion of the basin prior to the 1964 flood. Timber harvesting covered a substantial portion of the basin prior to the 1964 flood. Aerial photograph interpretation of 1941 and 1952 flights show the main activity appears to be maintenance of grassland and conversion of forestland to grassland. In many cases, this was by use of fire and often standing dead trees were present while there was no indication of skid trails for harvesting. Fire activity was the dominant land disturbance on 3,140 acres, most of it appearing to be relatively old fires by the amount of heavy brush vegetation and showing possible signs of previous logging. Timber harvesting was the predominant activity on 780 acres in the 1941 aerial photos. In the 1952 and 54 aerial photographs, there was no evidence of fire as a predominant activity. Instead, the predominant land use disturbance switched to timber harvesting for a total of 8,720 acres. Many acres appeared to have had continuous entries in the period between 1948 and 1954, especially in the Harris Creek area. The silviculture was a type of seed tree cut that often left brush and some conifer. Harvesting led to roads down streams and the activity covered all but the very headwater portions of the Mattole River. Timber harvesting activity since 1983 has covered about 21 percent of the subbasin, the highest level of harvesting in the Mattole Watershed. Both planning watersheds have had harvesting concentrated on the east side of the Mattole River. The silvicultural systems appear to be based on the uneven nature of the stands that were left after the first entries and primarily consist of even-aged regeneration methods, often using a rehabilitation or alternative prescription. Since 1983, cable systems account for half of the logging operations used. There are 371 acres in approved NTMPs. All utilize the tractor logging system.

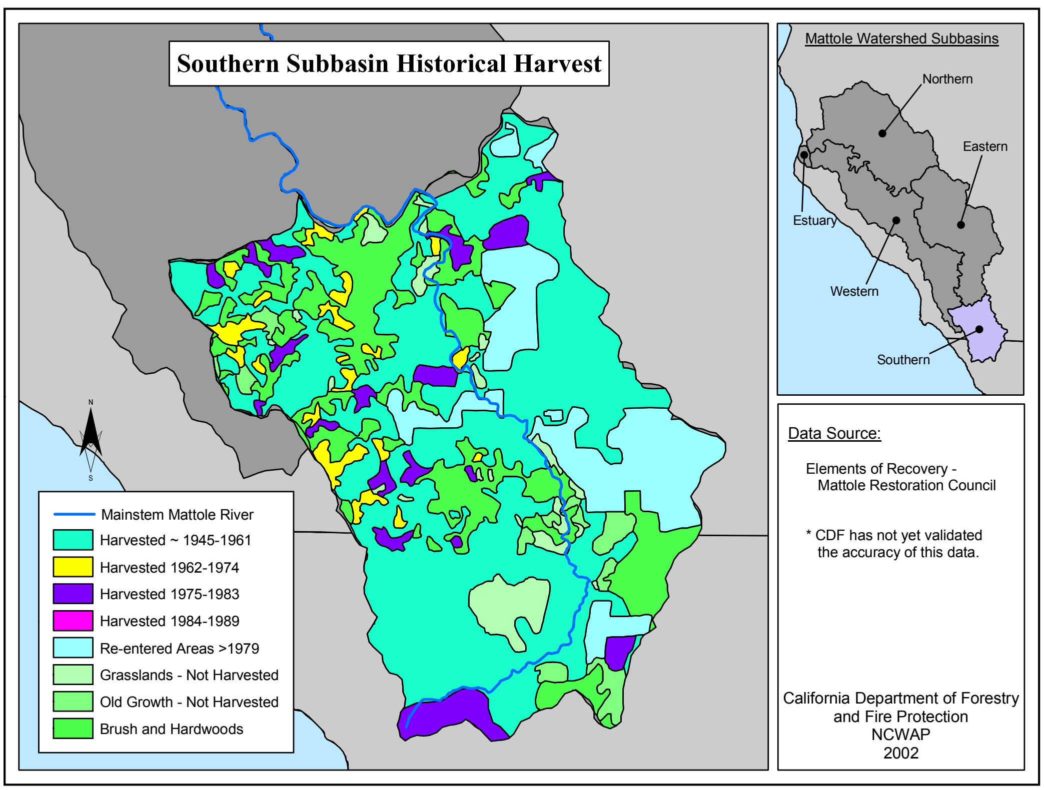


Figure 22: Timber Harvest History of the Southern Subbasin

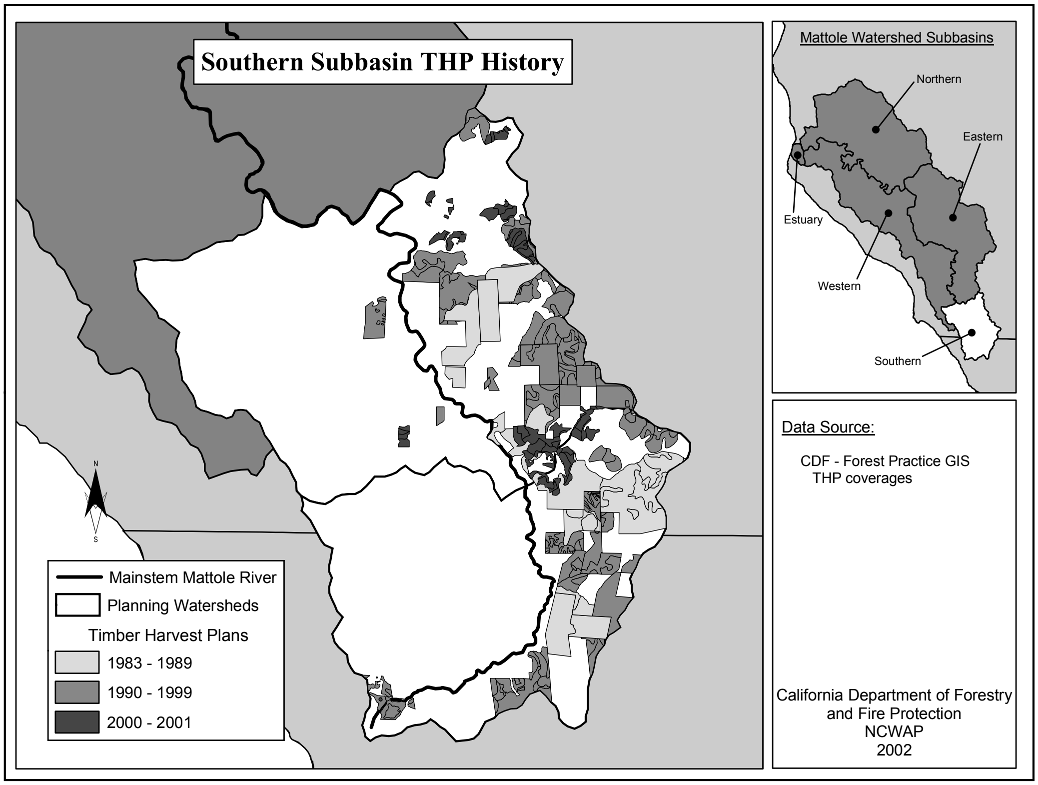


Figure 23: Timber Harvesting Plans 1983-2001, Southern Subbasin

Table 6: Timber Harvest History, Southern Subbasin

TIMBER HARVEST HISTORY - SOUTHERN SUBBASIN*				
	Total Harvested Acres	Total Area Harvested (%)	Average Annual Harvest (ac)	Annual Harvest Rate (%)
Harvested ~1945 - 1961**	8,875	50%	522	3%
Harvested 1962 - 1974**	546	3	42	<1
Harvested 1975 - 1983**	1,333	8	148	<1
Harvested 1984 - 1989	1,519	9	253	1
Harvested 1990 - 1999	2,299	13	230	1
Harvested 2000 - 2001	394	2	197	1
Not Harvested:				
Grasslands	714	4		
Brush and Hardwoods	3,402	19		

* Does not add to 100% due to data discrepancies, re-harvest areas, and uncut timber areas.

** CDF has not yet validated the accuracy of this data (obtained from MRC).

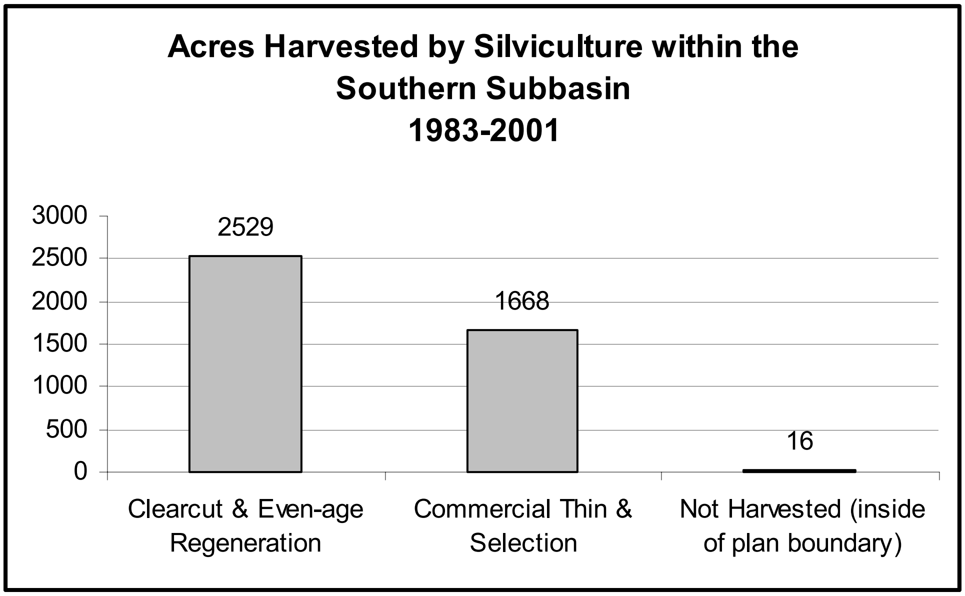


Figure 24: Silvicultural Systems, Southern Subbasin

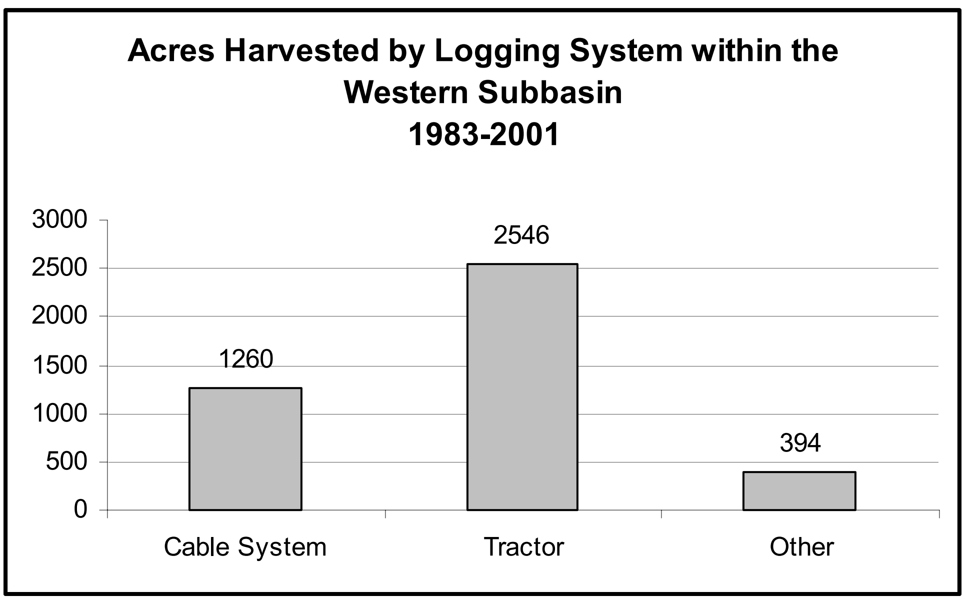


Figure 25: Logging Systems, Southern Subbasin

Riparian Conditions

Unless otherwise noted, the vegetation description in this section is based on manipulation of Calveg 2000 data. This is vegetation data interpreted from satellite imagery by the United States Forest Service, Remote Sensing Lab. The minimum mapping size is 2.5 acres.

Vegetation within 150 feet of the centerline of streams is 79 percent mixed conifer and hardwood forest, 12 percent hardwood, and 7 percent conifer forest, while annual grassland, shrubs and barren combined make up the remaining 2 percent. The Mattole River is at its headwaters here and is narrow enough to receive full shade across its width from riparian vegetation. Sixty-six percent of the riparian area is covered by trees in the 12 to 23.5 inch diameter size class. The area occupied by this single-width zone is 14 percent of the total Southern Subbasin acreage.

Western Subbasin

Calwater planning watersheds: Shenanigan Ridge, Squaw Creek, Woods Creek, Honeydew Creek, North Fork Bear Creek, Big Finley, South Fork Creek.

Vegetation

Unless otherwise noted, the vegetation description in this section is based on manipulation of Calveg 2000 data. This is vegetation data interpreted from satellite imagery by the United States Forest Service, Remote Sensing Lab. The minimum mapping size is 2.5 acres.

Mixed hardwood and conifer forests cover 55 percent of the area, conifer forest 7 percent, and hardwood forest 25 percent for a total of eighty-seven percent forested area. Grassland occupies 10 percent of the subbasin. Shrub, barren, agricultural lands, and urban classifications together cover the remaining 3 percent of the area. The forested vegetation reflects the impacts of harvesting. Fifty-eight percent of the Western subbasin is in the 12 to 23.9 inch diameter breast height (dbh) size class. Twenty percent is in a diameter size class greater than 24 inches diameter breast height.

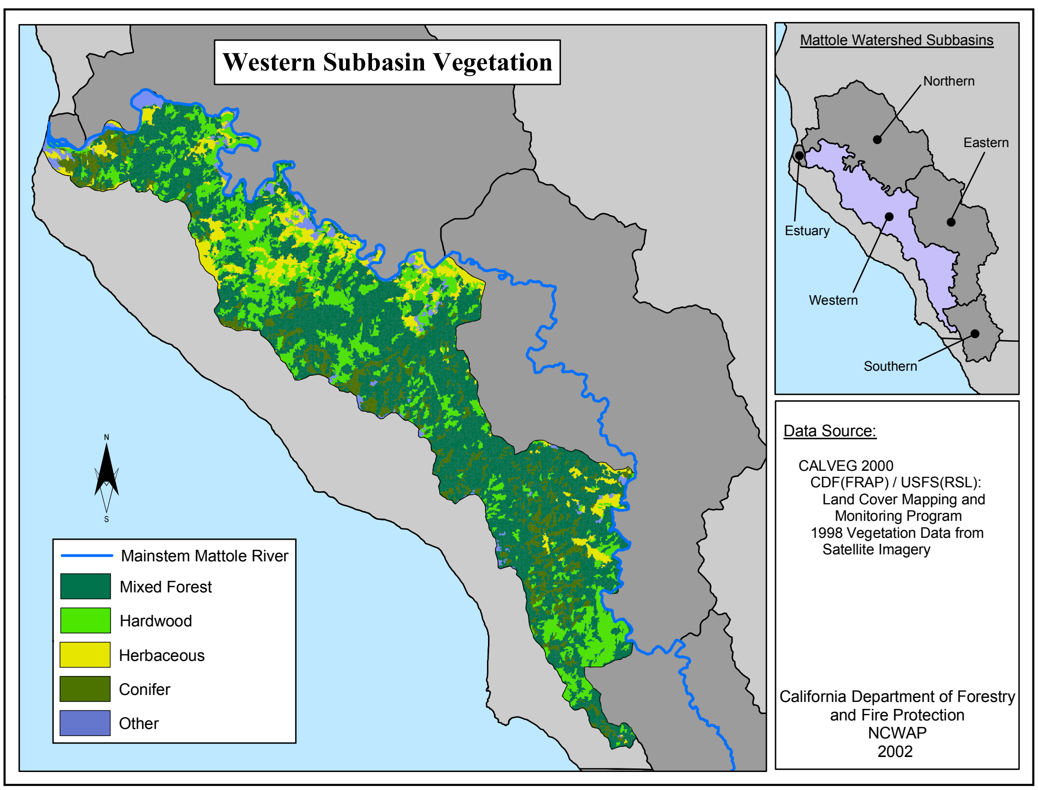


Figure 26: Vegetation of the Western Subbasin

Ownership

A substantial percentage (46%) of the subbasin is in public ownership managed by the Bureau of Land Management (BLM) as part of the King Range National Conservation Area. Designated as a Late Successional Reserve, it provides public recreation centering on a backcountry experience including hunting and camping. Part of the area is being considered for wilderness designation. The 220 acre Mill Creek Forest, recently acquired as public land, is an old-growth Douglas-fir and tan oak forest located in the lowest downstream part of this subbasin. The major land use activity on privately owned land is in ranching and timber management. Industrial timberland acreages are insignificant, no more than 365 acres in the Shenanigan Ridge and 275 acres in the Squaw Creek planning watersheds.

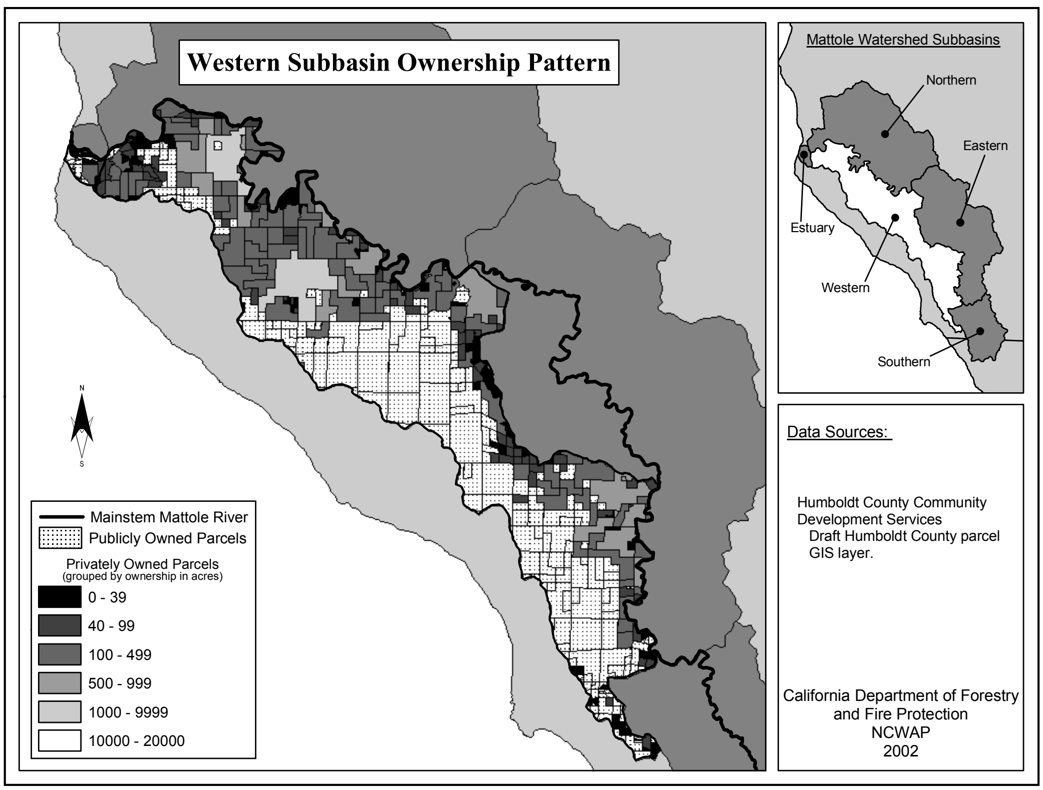


Figure 27: Ownership Pattern of the Western Subbasin

Land Use

The 1941 aerial photographs for the area show very low levels of disturbance within the subbasin. The largest acreage of disturbance was fire activity which appeared to be related to conversion. There was about 1,830 acres burned, all quite small areas that generally with dead trees standing. About 920 acres appeared harvested, but the logging system was almost entirely unknown because no skid trails were readily apparent. Perhaps the harvesting seen was the after effects of heavy tan oak logging from a few decades past, or is actually wildfire or conversion activity. As a result, the disturbance created by harvesting in this time period was low. In the 1954 aerial photographs, timber harvesting activity jumped to 8,850 acres, all tractor and all high disturbance. Fires continued at the same level of activity, occupying about 1860 acres. There has been almost no timber harvesting since 1983 in this subbasin. The public lands are managed by the Bureau of Land Management as the Kings Range National Conservation Area in a designation that does not include timber harvesting. The last timber harvesting by BLM consisted of salvage harvesting approximately 2.8 million board feet in 1975 following the 1974 Nooning Creek fire, and a few truckloads of salvaged logs after wildfires in 1978 and 1988 (H. Harrison, per. Comm.). Management activities are focused on restoration to pre-European impact conditions including extensive road stabilization and abandonment treatments. Public recreation use consists of primitive camping, hiking, hunting, and other dispersed activities. Neighboring landowners have expressed concern about road and land trespass and the possibility of wildfire from tourists. NTMPs utilizing the selection silvicultural system and tractor logging system are approved on 250 acres.

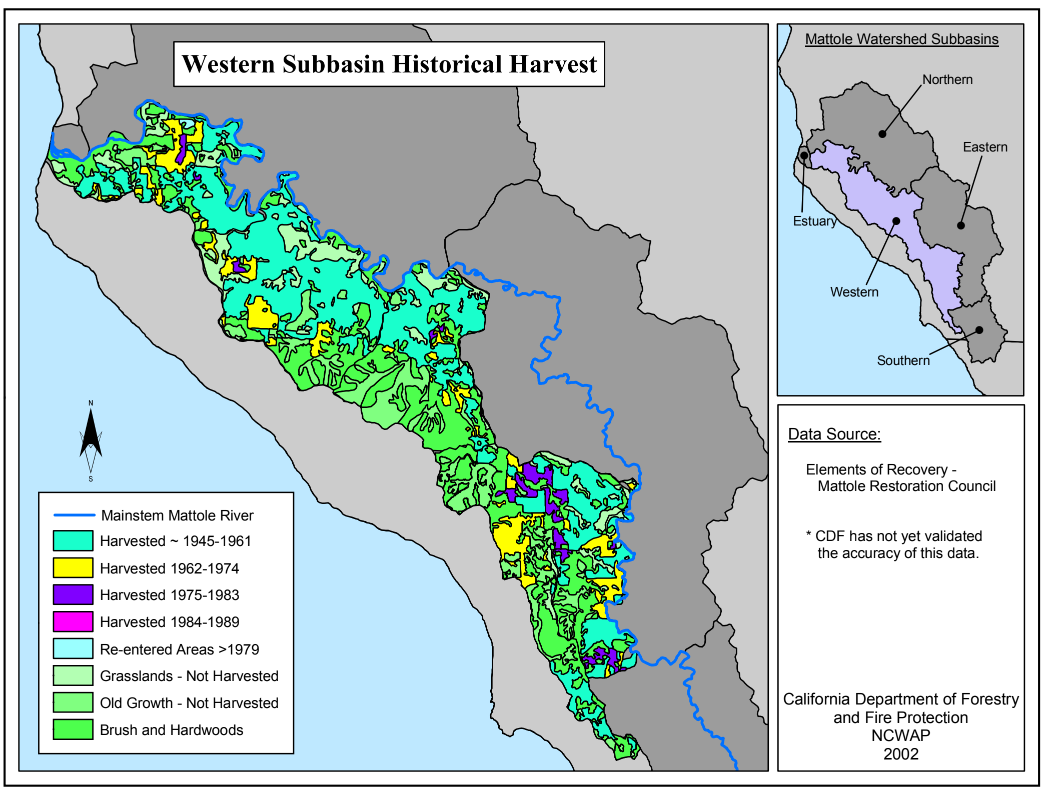


Figure 28: Timber Harvest History of the Western Subbasin

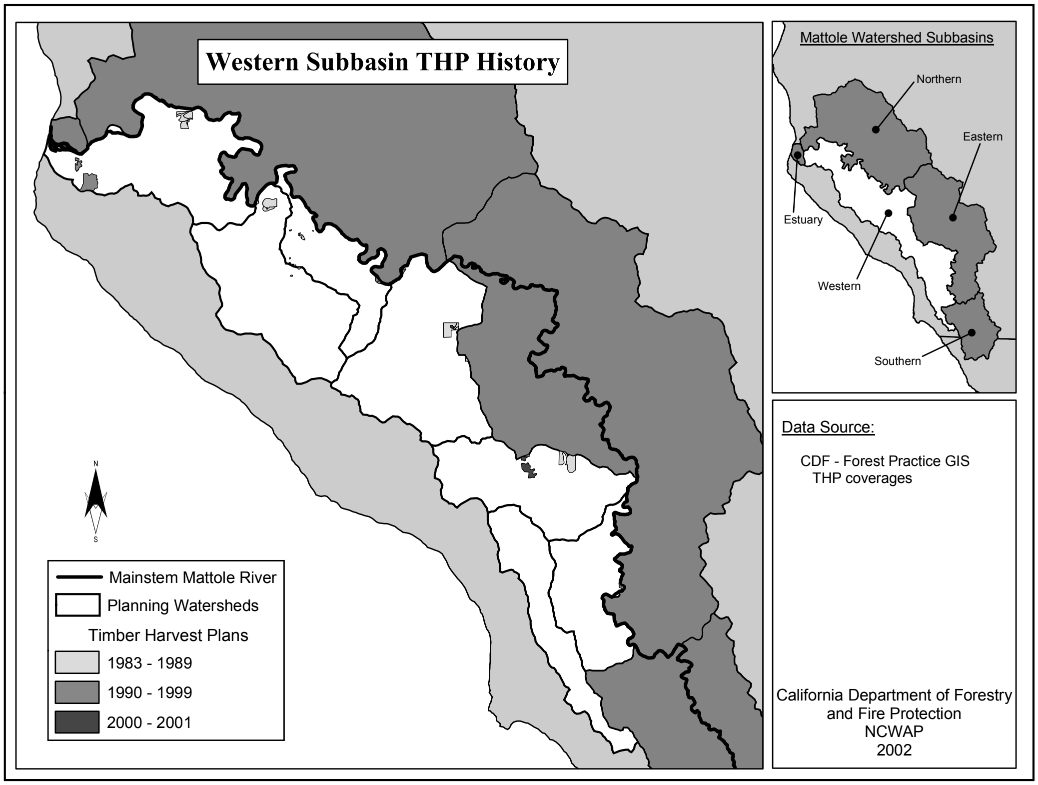


Figure 29: Timber Harvesting Plans 1983-2001, Western Subbasin

Table 7: Timber Harvest History, Western Subbasin

TIMBER HARVEST HISTORY - WESTERN SUBBASIN*				
	Total Harvested Acres	Total Area Harvested (%)	Average Annual Harvest (ac)	Annual Harvest Rate (%)
Harvested ~1945 - 1961**	20,544	36%	1,208	2%
Harvested 1962 - 1974**	5,222	9	402	<1
Harvested 1975 - 1983**	1,584	3	176	<1
Harvested 1984 - 1989	536	1	60	<1
Harvested 1990 - 1999	228	<1	23	<1
Harvested 2000 - 2001	87	<1	44	<1
Not Harvested:				
Grasslands	6,353	11		
Brush and Hardwoods	17,560	30		

* Does not add to 100% due to data discrepancies, re-harvest areas, and uncut timber areas.

** CDF has not yet validated the accuracy of this data (obtained from MRC).

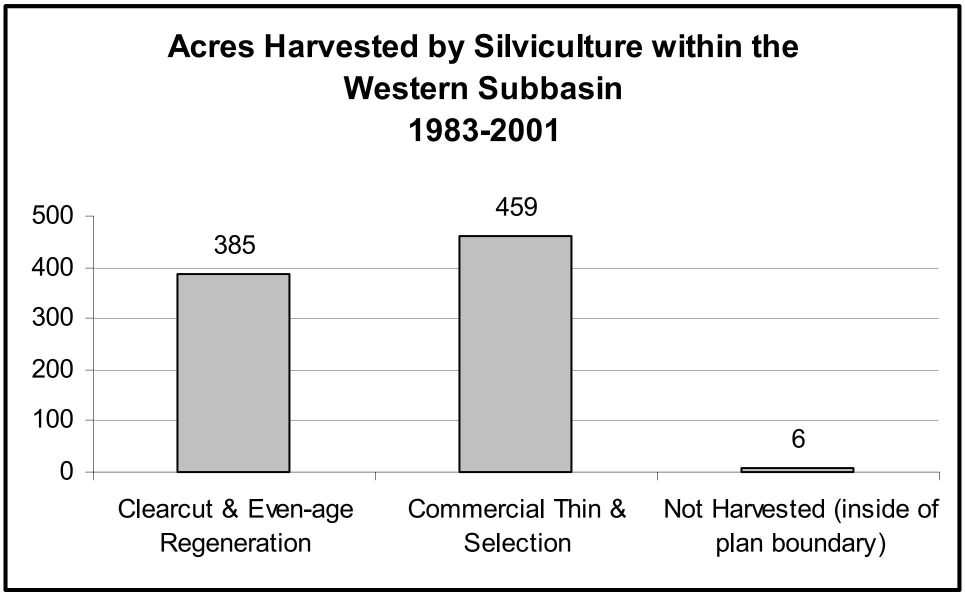


Figure 30: Silvicultural Systems, Western Subbasin

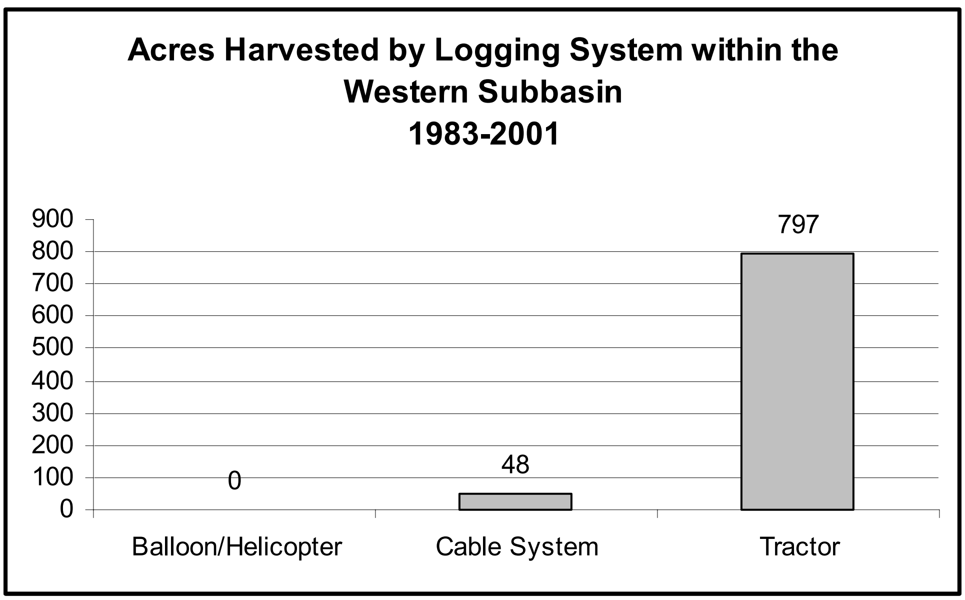


Figure 31: Logging Systems, Western Subbasin

Riparian Conditions

Unless otherwise noted, the vegetation description in this section is based on manipulation of Calveg 2000 data. This is vegetation data interpreted from satellite imagery by the United States Forest Service, Remote Sensing Lab. The minimum mapping size is 2.5 acres.

Vegetation within 150 feet of the centerline of streams is 58 percent mixed conifer and hardwood forest, 16 percent hardwood, and 15 percent conifer forest. One percent of the forest type is riparian hardwoods while another one percent is hardwood occupied commercial timberland site. The barren classification makes up 5 percent of the riparian area, all of it adjacent to the Mattole River. Annual grassland is 3 percent of the area, while shrubs, water, and agricultural lands comprise the remaining 2 percent. Sixty-six percent of the riparian area is covered by trees in the 12 to 23.5 inch diameter size class. The area occupied by this single-width zone is 13 percent of the total Western Subbasin acreage.

Land Use Synthesis

Determining the effects of land use practices on watershed processes is the subject of numerous research studies and modeling efforts. In addition, legislative and regulatory requirements are the basis for descriptions and cumulative effect analyses of specific land use proposals, especially timber harvesting on private land. Watershed analysis is proposed as the strategy that will "cure" the problem of inadequate cumulative effects analysis. Perhaps, but the difficulties of quantifying watershed cumulative effects in both space and time are cited in many scientific reports as a particularly sticky problem (Scientific Review Panel, 1999). The latest recommendation to the Board of Forestry recognizes that human promulgated activity on individual parcel of land will not produce consistent quantitative responses and instead proposes the evaluation of cumulative effects through "risk" or "gaming" modeling (The University of California Committee on Cumulative Watershed Effects, 2001). Rapid changes in Forest Practice regulation and consequent practices on the land will make it difficult to develop a numeric representation of land use practices using any methodology. Certainly, assessing cumulative watershed effects is dependent upon the resources targeted, available data, suitable models, and time and money.

Since the pathway to an "adequate" cumulative effects analysis is convoluted and fraught with uncertainty, one logical methodology for reducing risk is to reduce direct impacts since fewer direct impacts would presumably reduce cumulative impacts as well. This is the direction the Forest Practice Rules appear to be taking. Rule-making occurs in response to perceived risks that are not yet fully quantified. In fact, the rules could be considered as experimental hypotheses that current monitoring efforts test.

In 1996, the California Department of Forestry and Fire Protection (CDF) instituted the Hillslope Monitoring Program (HMP). The objective of the Hillslope Monitoring Program is to evaluate the implementation and effectiveness of Forest Practice Rules and special THP provisions specifically designed to protect water quality and riparian and aquatic habitat. In Hillslope Monitoring, the evaluation of effectiveness of the erosion control measures is based on the assumption that if soil is kept on site and out of stream systems, then water quality and riparian and aquatic habitat are protected from the effects of increased sedimentation. The Hillslope Monitoring Program utilizes a random sample of completed THPs that have over-wintered from one to four years. Over-wintering ensures that the erosion control measures been have been wet-weather tested, allowing CDF to gage the effectiveness of specific measures in the field. Independent contractors collect detailed information on randomly located road, skid trail, and WLPZ segments, as well as randomly located landings and watercourse crossings and enter it into the Hillslope Monitoring Database. A report of interim findings was prepared for the State Board of Forestry in June 1999. In 2001, Nonindustrial Timber Management Plans (NTMPs) were included with THPs for the random statewide sample. Currently, 295 THPs and 5 NTMPs have been evaluated as part of the HMP and an updated report based on the first 300 projects will be developed in 2002. This is an ongoing program that is expected to continue long into the future.

Interim findings in the June 1999 report indicate that roads and their associated crossings have the greatest potential for sediment delivery to watercourses. Problems were identified at about 40% of the evaluated crossings. The majority of these crossings were existing structures that were in place prior to the development of the THP, and many of the problems were related to maintenance issues. Common deficiencies included fill slope erosion, culvert plugging, scour at the outlet, and stream diversion potential. A substantial percentage of road-related rule requirements also had poor implementation ratings, but generally had less impact on water quality than poorly implemented crossing FPRs. Road rules most frequently cited for poor implementation were waterbreak spacing and the size, number, and location of drainage structures. For both crossings and roads, implementation of Forest Practice Rules that specify design, construction, and maintenance required improvement. Erosion problems on randomly selected skid trails and landings were infrequent and produced minor impacts to water quality.

Average canopy and ground cover remaining following harvesting in WLPZs exceeded Rule requirements (greater than 70 and 85%, respectively), and erosion events originating from current timber operations in WLPZs were rare. Overall, erosion problems related to timber operations were almost always associated with improperly implemented FPR requirements (Monitoring Study Group, 1999).

While this monitoring may tell the Department of Forestry whether the rules are performing to the letter of the law, it is unclear whether the data collected is useful in a cumulative effects assessment or can be applied to other analysis efforts. As a pervasive theme in monitoring for regulatory compliance, opportunities for dialog with researchers and other interested parties about their needs and coordination of effort should be formalized.

A sediment source inventory (Lewis et al. 2001) on ten ranches in the North Coast using a methodology developed for TMDL compliance provides another evaluation of site specific areas. In this survey, sediment delivery sites were identified and characterized as controllable, human-caused “source sites”, “unstable areas”, not impacted by current management , with a naturally high risk of erosion or that will not reasonably respond to efforts to influence sediment discharge, and “noninventory" sites having a volume of less than 10 cubic yards. After estimating the potential sediment generation over a 40 year period, unstable areas were estimated as providing 99.6 percent of the total potential sediment delivered to streams. Within this category, historical practices accounted for 66 percent of the potential deliverable sediment; natural conditions, 26 percent; roads, 8 percent; and other influences, less than 1 percent. Source sites comprised only 0.4 percent of the potential sediment, but within this category 77 percent of the sediment would come from roads. The results also made the authors question the capability of instream monitoring measurements capturing the change in sediment resulting from mitigation efforts on less than one percent of the potential sediment.

A technical bulletin produced by the National Council for Air and Stream Improvement (NCASI, 1999) summarizes research and studies related to sedimentary cumulative effects. The abstract concludes by stating “ …these factors suggest that we should not expect to detect less than a twofold change in sediment transport rates or sediment yields”. Appropriate and cost-effective monitoring strategies for the accurate detection of sedimentary impacts of individual projects are under discussion in many forums.

At Caspar Creek, in coastal Mendocino County, suspended sediment loads increased 212 percent after road-building in 1967 and selection tractor harvesting typical in the 1970’s prior to the establishment of the 1973 Forest Practice Rules. The same analysis methodology on data collected in the North Fork of Caspar after clear-cutting between 1989 and 1992 indicated no significant change in bedload or suspended sediment loads at the North Fork weir station, the furthest downstream station. However, increased sampling rates for the North Fork portion of the study allowed for a more sensitive analysis based on smaller tributary watersheds that indicated an 89 percent increase in suspending sediment concentrations. The difference between the 212 and 89 percent increases in the two watersheds is thought to be the result of differences in road location, logging system, and stream protection measures. It is interesting to note that these effects are attributed to the overall treatment in each watershed and that specific causative mechanisms are not concluded based on the statistical analysis, but rather from cause and effect inferred non-statistically based on the preponderance of evidence from many sources and studies. Both treatments and gaging stations in the North Fork phase of the study were nested to help track sediment routing and to test whether cumulative effects were occurring. In general, the effects of multiple disturbances were approximately additive but sediment from treated tributaries have not yet reached the lower main stem stations (Lewis 1998).

Overall, timber harvesting in the North Fork of Caspar did not increase peak flows of larger storm events in a way that significantly affected channel morphology or bedload. The ecological significance of increases in summer soil moisture, summer lowflow, subsurface flow, and changes in woody debris recruitment dynamics is not known. Increased stream flow as a result of the vegetation removal inherent in timber harvesting was the most significant variable in explaining increased suspended sediment loads (Ziemer 1998).

Redwood National Park analysis of suspended-sediment data collected at two stations in Redwood Creek over an extended period of time indicates that there is tremendous variability but that regression analysis of the relationship between sediment load and stream flow indicates that flow alone can explain about three-quarters of the variability. Trends show a significant downward trend in the rate of suspended-sediment transport between 1971 and 1994 at the Orick Station, but that the trend was reversed from 1995 to 1997 at both the Orick and O'Kane stations. Also cited were analyses that showed that suspended-sediment loads in Redwood Creek tributaries after timber harvesting prior to the 1980's doubled if streamflow differences were not considered, but that sediment loads increased by a factor of ten when increased run-off and hence stream flow were included in the analysis (Redwood National Park, 1999).

Cafferata and Spittler (1998) summarized and compared several studies on Caspar Creek, a coastal stream in Mendocino County, and other streams in coastal Northern California. They updated Rice's 1996 estimate of hillslope erosion for the North Fork of Caspar and concluded that the average hillslope erosion above natural background levels was 25.2 $yds.^3$ ac^{-1}, or about half of that estimated for the South Fork of Caspar. In general, the estimated amount of sediment delivered to streams under modern (1990s) Forest Practice rules is approximately one-quarter the amount estimated from activities prior to the Forest Practice Rules. While the legacy road system in the South Fork of Caspar was quiescent for a few decades, road related landslides delivering sediment occurred in 1998 during an uncommonly wet El Niño year.

Likewise, legacy roads in Redwood Creek are still eroding. In 1997, a regional storm produced a 12 year recurrence flood event that resulted in the highest flows since 1975. Two-hour rainfall amounts were in the 2 year recurrence range. Although relatively few culverts failed on national park lands in lower Redwood Creek, many of the abandoned roads had fill failures that initiated debris torrents.

Although Redwood National Park staff acknowledge the difficulties of estimating the amount of sediment generated by hillslope fluvial processes, including road-induced gullies and subsurface water interception, Park staff concluded, based on cited studies, that fluvial erosion was a significant sediment producer, perhaps as much as that produced by mass wasting. The North Coast Regional Control Board, as part of the TMDL process for the Mattole, will be developing a sediment budget and releasing their document prior to the end of 2002. One of findings in the Mattole NCWAP CGS investigation was the increase in the number and length of gullies between 1984 and 2000 recorded in the aerial photograph interpretation. This assessment did not establish cause of the increase, but a field-based survey of gullies and their causative factors is recommended.

An estimate of sediment generation can be grossly estimated by these kinds of data, but it is not clear what the best way to monitor the response to the inputs is. The dynamic equilibrium of the river channel fluxes within a range that results from changes in flow, sediment supply and the form of the river. In a balanced system, over some period of time, the river will self-adjust and move towards equilibrium. The channel forming flow that transports most of the sediment is determined by combining known (or derived) discharge and sediment transport rates. In relatively humid environments, channel forming flow occurs at moderate flood intervals rather than during infrequent large magnitude storms (Florsheim, J., 1995)

The Mattole watershed does not have a pre-human disturbance baseline geomorphic description. Earliest aerial photographs were taken in the 1940's, after substantial grazing and conversion activity. These earliest aerial photographs have not had fluvial mapping due to time constraints in the NCWAP project. Fluvial geomorphology was mapped from 1984 and 2000 aerial photographs. The data, maps, and results are discussed in the Mattole Synthesis report and the California Geological Survey appendix. The 1984 aerial photographs were selected for mapping because of the freshness of the landslide features present. These photographs were taken the summer of the hydrologic year (1983/84) having the highest annual rainfall (110 inches), recorded at the Petrolia gage during its period of record 1958-1995. It was also the highest annual rainfall for the Whitethorn (144") and Honeydew Store (159") gages, both of which had shorter periods of record. Of the remaining two gages, the Upper Mattole highest annual rainfall was 130.64 inches in 1904, while 1983 rainfall was a virtual tie at 130.59 inches in a record that extended from 1898-1986 and a Honeydew gage that recorded 174 inches in 1958 during a period of record of 1954-1978 (DWR Appendix). The 1983 water year also had the seventh highest instantaneous peak flow during a period of record that extends from 1951-2000. On the other hand, the 2000 aerial photographs were used for mapping because they are the most currently available. Large hydrologic events during the period of record between 1984 and 2000 include the sixth highest instantaneous peak flow in 1995. The 1997 storm, a significant storm in other parts of Northern California, only produced stream flow records for the Mattole indicating a return interval of about 2.8 years (DWR Appendix). Of records kept between 1970 and 2000, only a few Mattole gages report 24 hour rainfall totals in excess of 10 inches, the Honeydew gage recorded one instance each in 1971, 1980 and 1993, and at the Wilder Ridge gage, once in 1980, twice in 1982 and 1983, several more in the following years and then one per year in 1995, 1996, and 1997 (Goodridge, 2001).

Cross-section profiles for the Mattole are limited to a few stations established by MCR in the early 1990's. These are generally acknowledged as being placed in a poor location for monitoring. One of the few long-term cross-section monitoring locations that can be grossly compared to the Mattole is in Redwood Creek. In Redwood Creek, the U. S. Geological Survey established cross-sections in 1973 and monitored them annually until 1986. Redwood National Park staff periodically surveyed a subset of the cross-sections since 1982. In general, the upstream cross-section measurements indicate that the channels scoured until the mid-1980s and have remained unchanged since then. Within the National Park in lower Redwood Creek, the channel is still widened and aggraded. The fluvial geomorphology analysis by CGS in the Mattole indicates that the lower portion of the Mattole is also in a widened and aggraded condition that has improved somewhat in the 1984-2000 analysis period. CGS concluded the rate of sediment input to the Mattole fluvial system decreased between 1984 and 2000 based on the spatial pattern of decreasing negative mapped channel characteristics (NMCC) within the bedrock terrains (generally found in tributary streams). CGS further concluded that the concentration and redistribution of NMCC in the Quatenary portions of the Mattole (generally the larger and downstream portions of the river system) suggests that historic sediment inputs are visibly moving downstream.

Interestingly, the Department of Fish and Game sponsored relatively little stream clearing or large woody debris removal projects in the Mattole. Existing levels of large woody debris are thought to be abnormally low, however, and even if mostly a result of natural occurrence, may reflect dislocation after the two one-hundred year flood events in 1955 and 1964. Most of the coniferous forest in the Mattole watershed is Douglas-fir with minor amounts of other species. It is unlikely that large amounts of partially submerged wood were removed as a commercial salvage because Douglas-fir decays rather rapidly. Road and landing construction near and in streams probably removed substantial amounts of wood to prevent large woody debris from deflecting water into the new construction. The three types of site-specific information needed to establish large woody debris parameters are 1) the role of dead wood in the watershed; 2) the range of in volume and size of dead wood in both managed and pristine streams of the same forest type, and 3) historical and projected conditions related to wood recruitment and longevity both in the riparian forest and in-stream (Lisle, 1999). Any modeling efforts for the Mattole will need to incorporate natural levels of disturbance, such as high rates of landsliding from unstable slopes and high 24 hour rainfall intensities, that are characteristic of this watershed.

Stream temperature is dependent on stream width and depth, air temperature, solar input, and receiving waters, both tributary and groundwater flow. Streams warm in the downstream direction as streams increase in width and are less influenced by canopy shading, as air temperature increases as elevation decreases, and as receiving waters become a smaller proportion of the stream flow (Sullivan et al.1990). As part of the TMDL process for the Mattole, aircraft carrying thermal sensing equipment flew over the Mattole River and some of its main tributaries in July 2002. This allowed for the collection of data at sites that are not accessible to agency personnel on the ground. Based on the surface temperature information gathered and CalVeg2000 vegetation data, North Coast Water Quality Control Board staff developed an expected or pre-European stream temperature signature based on modeling for the Mattole and established TMDL targets for the impaired stream temperature portion of the TMDL. The Mattole synthesis report and the Water Quality appendix both provide a discussion on the data from instream monitoring devices that provide general agreement with the surface temperature trends. The detailed aerial flight includes photographs of each data point allowing a view of the entire riparian area flown. Cooler water from tributaries and ground water are spatially located in the data set and allows managers to find cold water refugia that may warrant additional protection. Periodic thermal sensing flights and limited in-stream temperature sampling may provide the most efficient use of resources in producing comprehensive monitoring data.

Mattole Subbasin trends between 1984 and 2000 are generally positive although the lack of consistent long-term data implies a substantial amount of conjecture. Fluvial work did not undertake analysis of fluvial conditions prior to 1984. Both the 1955 and 1964 floods were one hundred year return events while all other major storm events in the years 1951-2000, the period of record for the Petrolia stream gauge, hover around the ten-year flood event level. The short time period of stream temperature data results does not allow for any trend analysis. There is no data on suspended sediment. Current estimated populations of Chinook salmon and coho salmon throughout the Mattole Basin are low compared to United States Fish and Wildlife Service (USFWS) estimated populations in 1960. Outmigrant trapping of steelhead trout appears to indicate that their population is closer to the 1960 USFWS population estimate. However, not enough quantitative data on any salmonid species exists to establish clear trends on a subbasin basis.

The size and density of the riparian zone vegetation on private timberlands zoned for timber production will increase over time due to timber harvesting plan regulations. Lands owned by the Pacific Lumber Company have additional restrictions that are part of their Habitat Conservation Plan. The size and density of riparian vegetation is also expected to increase on publicly owned lands within the Mattole watershed. BLM lands are designated as late successional reserves and State Park lands are dedicated to conservation and recreational uses. Existing conservation easements, especially in the Southern Subbasin, are expected to allow the size and density of riparian vegetation to increase. While there has been a significant use of conservation easements in the Mattole in the past, recent changes in estate tax laws make it difficult to estimate future interest in this type of restricted land use program. There is no trend in vegetation change that can be inferred for riparian areas that are bordered by privately owned grasslands. Humboldt County requires new construction setbacks from watercourses that will help preserve existing riparian vegetation, but the clearing of vegetation by landowners as part of rural residential living is not regulated outside of the Coastal Zone. Mendocino County does not require building setbacks adjacent to streams, but does refer permit applications to the California Department of Fish and Game that the County finds may have environmental concerns. Both counties have additional regulations associated with flood plains and the Coastal Zone. Trends for riparian zones bordered by or containing roads are also unclear. It is possible that some roads may be abandoned and riparian vegetation re-established, but many of the roads are county roads, lead to streamside county roads, or access home sites. Riparian vegetation may be sacrificed in road maintenance activities, both regular and storm induced.

The number of roads within the watershed can be expected to increase as private timberlands are harvested for the first time since the application of current Forest Practice rules. These rules and current practices generally require road systems located high on the slopes unlike earlier timber harvest and transportation systems that established roads low on the slopes, often near streams. In addition, improved construction standards and upgrading of existing roads is a general requirement in the THP permitting process. The number of roads should remain the same or decrease on public lands since they are designated as late successional reserves dedicated to conservation and recreational uses. The trend in the number of roads on grazing, agricultural, and residential private lands is unknown. A small increase in the number of roads may occur as a result of continued development.

Potential Sediment Production EMDS in the Mattole

The final results for the Mattole EMDS (Figures 32, 33, and 34) are applicable only to the Mattole watershed and rank planning watershed level potential suitability for salmonids based on the relative values derived from Mattole data. The complete set of map outputs are in the back of the detailed EMDS Appendix (B). Planning watersheds shown in lightest tones indicate where sediment is potentially the least. A low EMDS rating (darker tones) in the maps in general indicates areas of increased potential problems for stream and fishery conditions at the planning watershed scale. Those of intermediate tone fall in between the former two extremes. It is assumed that sediment production above natural background levels causes problems for salmonids.

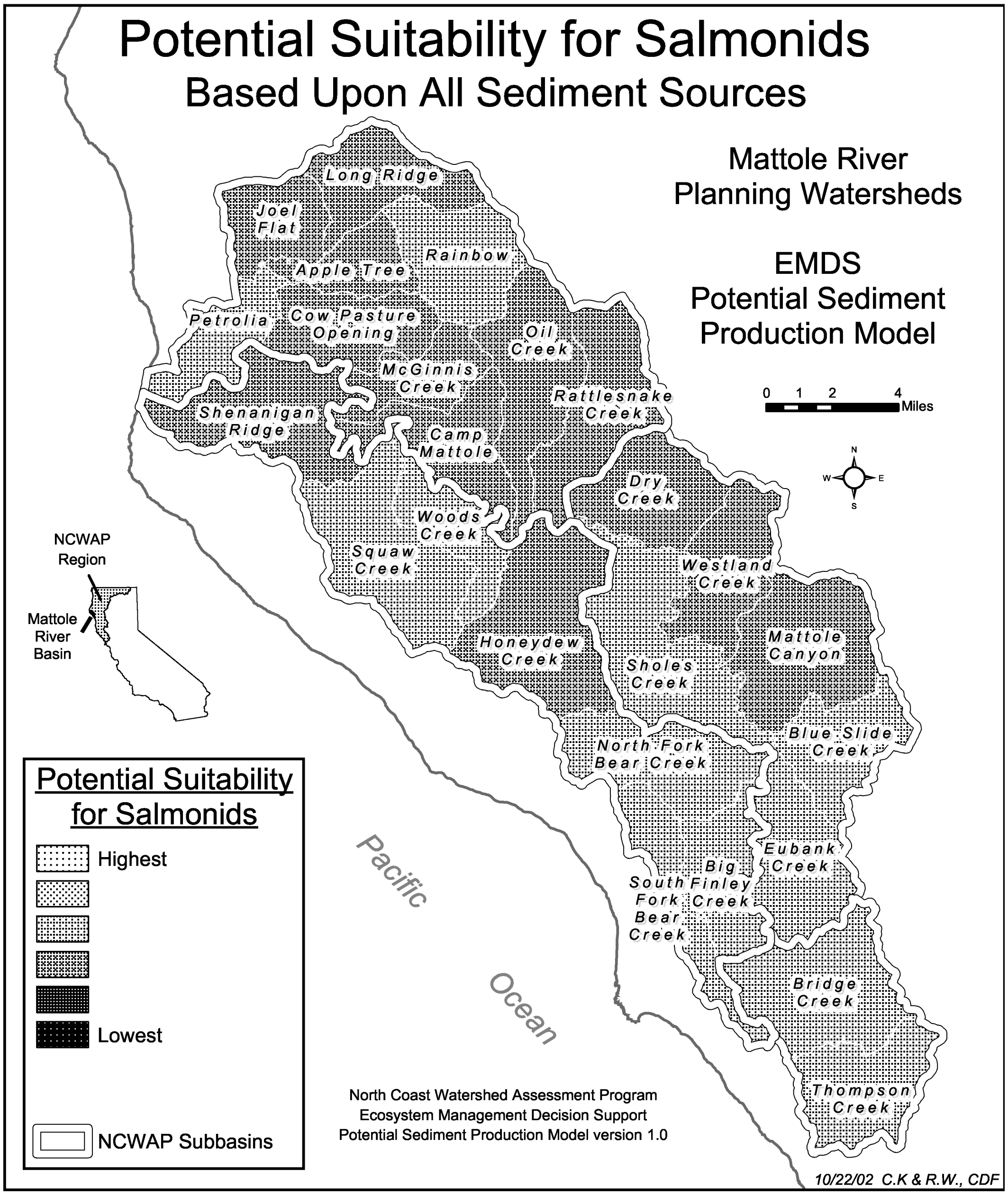


Figure 32: EMDS Results Based Upon Natural and Management Sediment Sources.

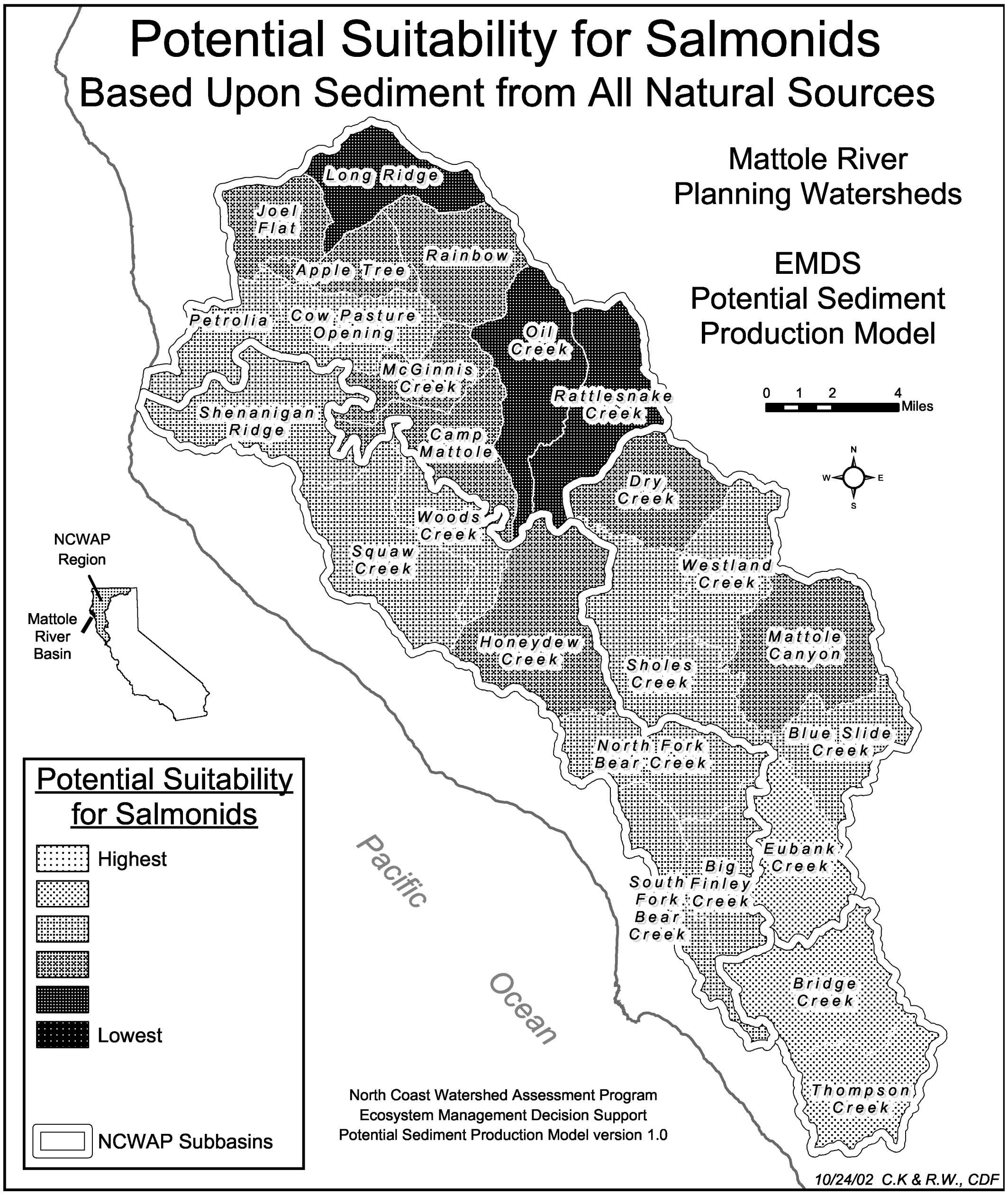


Figure 33: EMDS Results Based Upon Sediment from All Natural Sources. This map shows the mean (average) of all 3 Natural Process model networks: 1) *Sediment from Natural Mass Wasting*; 2) *Sediment from Natural Surface Erosion*; and 3) *Sediment from Natural Streamside Sources*.

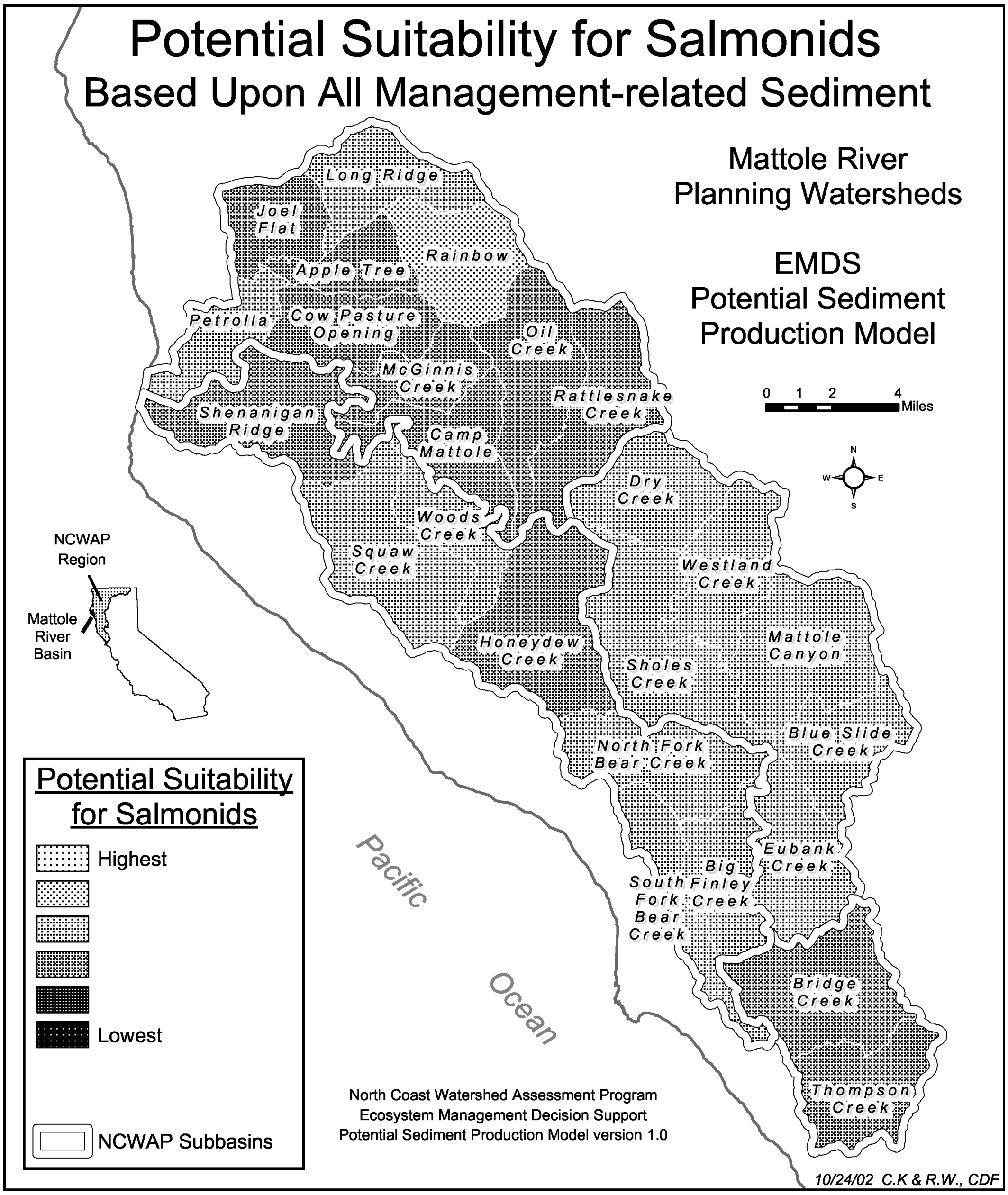


Figure 34: EMDS Results Based Upon All Management-related Sediment. This map shows the potential sediment delivery to streams from roads and land use. The ratings are (for each planning watershed) the mean (average) value of 3 networks: 1) *Management-related Mass Wasting;* 2) *Management-related Surface Erosion*; and 3) *Management-related Streamside Erosion.*

The following table provides the specific data path used in Mattole EMDS model. The figure numbers cited in the first column refer to figures in the CDF EMDS Appendix (B) and are included as a cross-reference tool. The percentage weight column provides a simplified numeric summary of the nested weights used in the model. The EMDS model uses the weighting system in a nested strategy, so the percentages should not be construed as simply additive.

Table 8: Reference Curve Metrics for the EMDS Model, version 1.0

Sediment Production Factor	Definition*	Weights**	Percentage Weight***
Total Sediment Production (EMDS Map Output – Figure 18)	**The mean truth value from Natural Processes and Management-related Processes**		
Natural Processes (EMDS Map Output – Figure 19)	**The mean truth value from Mass Wasting I, Surface Erosion I (no data, value = 0) and Streamside Erosion I knowledge base networks**	**0.5**	**5**
Mass Wasting I **EMDS Map Output – Figure 20)**	The truth value from natural mass wasting: Landslide Potential	0.33	16.7
Landslide Potential Class 5	Percentage area of watershed in class 5 (CGS rating)	0.8	13.3
Landslide Potential Class 4	Percentage area of watershed in class 4 (CGS rating)	0.2	3.3
~~Surface Erosion I~~ NO DATA **(EMDS Map Output – Figure 21)**	~~The mean truth value from natural processes of surface erosion: Gullies, Soil Creep, and Fires~~	~~0.33~~	~~16.7~~
~~Gullies~~	~~Density of natural gullies in planning watershed (currently no data supplied to model here)~~	~~0.33~~	~~5.6~~
~~Soil Creep~~	~~Percentage area of planning watershed with soil creep (currently no data supplied to model here)~~	~~0.33~~	~~5.6~~
~~Fires~~	~~Percentage area of planning watershed with high fire potential (currently no data supplied to model here)~~	~~0.33~~	~~5.6~~
Streamside Erosion I **(EMDS Map Output – Figure 22)**	The mean truth value from natural processes of streamside erosion: Bank Erosion, Inner Gorge Landslides and Non-inner Gorge Landslides	0.33	16.7
Active Landslides Connected to Streams **(EMDS Map Output – Figure 23)**	Percentage of planning watershed with Active Landslides connected to watercourses	0.60	10.0
Active Landslides Not Connected to Streams (**EMDS Map Output – Figure 24)**	Percentage of planning watershed with Active Landslides not connected to watercourses	0.30	5.0
Disrupted Ground near Streams **EMDS Map Output – Figure 25)**	Percentage of planning watershed with Disrupted Ground near to watercourses	0.10	1.7
Management-related Processes (EMDS Map Output – Figure 26)	**The mean truth value from Mass Wasting II, Surface Erosion II and Streamside Erosion II knowledge base networks**	**0.5**	**50%**
Mass Wasting II **(EMDS Map Output – Figure 27)**	The mean truth value from management-related mass wasting: Road-related and Land Use-related	0.33	16.7

Sediment Production Factor	Definition*	Weights**	Percentage Weight***
Road-related **(EMDS Map Output – Figure 29)**	Coarse sediment contribution to streams from roads from the mean of Density of Road/Stream Crossing, Density of Roads by Hillslope Position, and Density of Roads on Unstable Slopes	0.5	8.3
Density of Road/Stream Crossings **(EMDS Map Output – Figure 36)**	(2nd choice of SOR node, averaged with DRHP directly below) Number of road crossings/km of streams	0.33	2.8
Density of Roads / Hillslope Position **(EMDS Map Output – Figure 34)**	Weighted sum of road density by slope position (weights determine relative influence, and sum to 1.0)	0.33	2.8
road length on lower slopes	Density of roads of all types on lower 40% of slopes	0.6	1.7
road length on lower slopes	Density of roads of all types on mid-slope (41-80 % of slope distance)	0.3	0.8
road length on upper slopes	Density of roads of all types on upper 20% of slopes	0.1	0.3
Density of Roads on Unstable Slopes **(EMDS Map Output – Figure 35)**	Density of roads on geologically unstable slopes	0.33	2.8
Land Use related **(EMDS Map Output – Figure 28)**	Coarse sediment contribution to streams from intensive, timber harvest, and ranched areas (*see below in table**) <10th percentile highest suitability; >90th percentile lowest suitability	0.5	8.3
On slopes of *high* potential instability	Slope stability defined by CGS map class 5	0.7	
On slopes of *moderate/high* potential instability	Slope stability defined by CGS map class 4	0.17	
On slopes of *low/moderate* potential instability	Slope stability defined by CGS map class 3 ~~(or SHALSTAB if unavailable)~~	0.09	
On slopes of *low* potential instability	Slope stability defined by CGS map classes 1 and 2 ~~(or SHALSTAB if unavailable)~~	0.04	
Land Use related mass wasting parameter details (evaluated separately for each category of potential slope instability)	(Weights, showing the relative influence of each parameter, sum to 1.0)		
• intensive land use			
--developed areas	Percentage of the planning watershed area in high density buildings and pavement	0.2	****1.7
--farmed areas	Percentage of planning watershed area in intensive crop cultivation	0.2	****1.7
• area of timber harvests	Percentage of planning watershed area tractor logged weighted by time period (years)		****4.2
--Era 0 (2000 – present)	Tractor logged area 2000-present	0.2	****1.7
--Era 1 (1990 – 1999)	Tractor logged area 1990-1999	0.12	****1.0
--Era 2 (1973 – 1989)	Tractor logged area 1973-1989	0.06	****0.5
--Era 3 (1945 – 1972)	Tractor logged area 1945-1972	0.12	****1.0

Sediment Production Factor	Definition*	Weights**	Percentage Weight***
• ranched area	Percentage of watershed area used for grazing livestock; estimated based on vegetation type and parcel type	0.1	****0.8
Surface Erosion II **(EMDS Map Output – Figure 30)**	The mean truth value from management-related surface erosion: Road-related and Land Use-related	0.33	16.7
Road-related **(EMDS Map Output – Figure 32)**	Fine sediment contribution to streams from roads from either SEDMODL_V2 (first choice) or the mean of Density of Roads Proximate to Streams, Density of Road-related Gullies, Density of Roads by Hillslope Position, and Road Surface Type	0.5	8.3
Density of Roads Proximate Streams **(EMDS Map Output – Figure 37)**	(2nd choice of SOR node, averaged with 3 subsequent road-related measures directly below) Length of all roads within 200' of stream ÷ length of all streams	0.25	2.8
Density of Roads Hillslope Position **(EMDS Map Output – Figure 34)**	Weighted sum of road density by slope position	0.25	2.8
road length on lower slopes	Density of roads of all types on lower 40% of slopes	0.6	1.7
road length on lower slopes	Density of roads of all types on mid-slope (41-80 % of slope distance)	0.3	0.8
road length on upper slopes	Density of roads of all types on upper 20% of slopes	0.1	0.3
~~Density of Road-related Gullies~~ NO DATA	~~Density of gullies related to roads~~ **(no data, value = 0)**	~~0.25~~	~~2.8~~
~~Road Surface Type~~ NO DATA	~~Percentage of roads with surfaces that are more likely to deliver fine sediments to streams (no data currently supplied to model here)~~ **(no data, value = 0)**	~~0.25~~	~~2.8~~
Land Use related **(EMDS Map Output – Figure 31)**	Fine sediment contribution to streams from intensive, timber harvest, and ranched areas (*see below in table***)	0.5	8.3
On slopes of *high* potential instability	Slope stability defined by CGS map class 5	0.7	
On slopes of *moderate/high* potential instability	Slope stability defined by CGS map class 4	0.17	
On slopes of *low/moderate* potential instability	Slope stability defined by CGS map class 3 ~~(or SHALSTAB if unavailable)~~	0.09	
On slopes of *low* potential instability	Slope stability defined by CGS map classes 1 and 2 ~~(or SHALSTAB if unavailable)~~	0.04	
Land Use related surface erosion parameter details	(evaluated separately for each of the four categories of potential slope instability)		
• intensive land use	Land where human activity is intensive		

Sediment Production Factor	Definition*	Weights**	Percentage Weight***
--developed areas	Percentage of the planning watershed area in high density buildings and pavement	0.2	****1.7
--farmed areas	Percentage of planning watershed area in intensive crop cultivation	0.2	****1.7
• area of timber harvests	Percentage of planning watershed area tractor logged weighted by time period (years)		****4.2
--Era 0 (2000 – present)	Tractor logged area 2000-present	0.2	**** 1.7
--Era 1 (1990 – 1999)	Tractor logged area 1990-1999	0.12	****1.0
--Era 2 (1973 – 1989)	Tractor logged area 1973-1989	0.06	****0.5
--Era 3 (1945 – 1972)	Tractor logged area 1945-1972	0.12	**** 1.0
• ranched area	Percentage of watershed area used for grazing livestock; estimated based on vegetation type and parcel type	0.1	****0.8
Streamside Erosion II **(EMDS Map Output – Figure 33)**	The mean truth value from management-related streamside erosion: Road-related and Land Use-related	0.33	16.7
Density of Roads Proximate to Streams **(EMDS Map Output – Figure 37)**	Length of all roads within 200' of stream ÷ length of all streams	0.33	5.6
Density of Road/Stream Crossings **(EMDS Map Output – Figure 37)**	Number of road crossings/km of streams	0.33	5.6
~~Density of In-stream Timber Harvest Landings~~ NO DATA	~~Number of legacy timber harvest landings in-stream per unit length of stream~~ **(no data, value = 0)**	~~0.33~~	~~5.6~~

****all breakpoints for the sediment production risk model were created from the tails of the cumulative distribution function curves for each parameter, at the 10th and 90th percentiles. Thus all resultant values are relative to the basin as a whole, but are not rated on an absolute basis***

**weights for parameters at each node sum to 1.0; indentation of weight shows the tier where it is summed
***percentage weights rounded to nearest one tenth of one percent.
****percentage weights of each land use summed for all slope stability classes

Table 9 provides a generalized summary of the factors that are included in the EMDS model. The EMDS categories listed below are sediment production factors that have empirically-based values for the model. The values are summarized in the next four columns. For each evaluated sediment production factor, the mean and standard deviation are computed for all planning watersheds in a basin. In some cases raw inputs are evaluated, and in others synthetic parameters (weighted combinations) of input values are evaluated. Breakpoints are then selected to rank each planning watershed for that factor in relation to all others in the basin. We used a simple linear approximation of the standardized cumulative distribution function, with the 10th and 90th percentiles serving as the low and high breakpoints. Thus the truth values for all Potential Sediment Production model variables are directly related to the percentile rank of that planning watershed. While not comparable outside of the context of the basin, such rankings do provide an indication of relative problems within the basin. Thus the percentages (in the breakpoints) are not always literal percentages of the PW. The model percentage weight column is provided to give a simplified idea of the importance of each of the sediment production categories. The reader should be cautioned that these factors are often nested in larger categories and so are not treated equally in the model.

Table 9: EMDS Breakpoints for the Mattole River Basin

EMDS Categories	Low Breakpoint (~1.3 Standard Deviations)	High Breakpoint (~1.3 Standard Deviation)	Average Value	Breakpoint Range	Model Percentage weight	Comments
Natural Processes						
Percent area of PW (Planning Watershed) with (weighted) Class 4 and 5 Landslide Potential*	15.3%	36.2%	25.8%	21.0%	16.70% up to (36%)	Class 5 has four times the influence of Class 4. The amount of acres in the Class 5 landslide potential category has the greatest influence on potential suitability outputs. This category is the major influence on an additional 19.5% in the Land Use Section.
Percent area of PW with Active Landslides Delivering to Streams	0	9.6%	4.8%	9.6%	10%	Active landslides within the historic period, about 150 years. Many of these slides may have originated as a result of land use practices.
Percent area of PW with Active Landslides Not Delivering to Streams	0	1.0%	0.5%	1.0%	5%	This is a tight range, so a small change, as little as a tenth of a percentage may impact the rating for a PW in its category
Percent area of PW with Disrupted Ground within 200' of Stream	0	4.5%	2.3%	4.5%	1.70%	

EMDS Categories	Low Breakpoint (~1.3 Standard Deviations)	High Breakpoint (~1.3 Standard Deviation)	Average Value	Breakpoint Range	Model Percentage weight	Comments
Surface Erosion - Natural Gullies					5.60%	No data entered, requires field validation. The number of gullies observed by CGS was significant, especially in the soft terrain type, however that information could not be used because gully causation cannot be reliably determined from aerial photographs.
Surface Erosion -Soil Creep					5.60%	No data, requires modeling and/or extensive field work.
Surface Erosion- Fire Potential					5.60%	No data, requires modeling and/or extensive field work.
Land Use Processes						
Percent area of PW with Land Use weighted for Mass Wasting	0.011	0.038	0.025	0.026	Up to 8.3%	The total impact value is reduced by the amount of land area not in designated land use categories. Since all land uses are weighted by the landslide potential classes, the amount of Class 5 acreage with any land use is a significant component of the PW outcome.
Percent area of PW with Land Use weighted for Surface Erosion	0.011	0.038	0.025	0.026	Up to 8.3%	The total impact value is reduced by the amount of land area not in designated land use categories. Since all land uses are weighted by the landslide potential classes, the amount of Class 5 acreage with any land use is a significant component of the PW outcome.
Density of Road Crossings (per km length of Stream)	0	2.22	1.11	2.22	8.40%	A small change in the number of road crossings may impact the rating for a PW in this category.
Density of Roads by Hillslope Position (mi/mi^2)	0.69	2.07	1.36	1.39	5.60%	
Density of Roads Close to Streams (mi/mi^2)	0.01	0.44	0.22	0.43	8.40%	These roads are also counted in the hillslope position, some portion of an additional 4.3%, making this one of the most significant of the road factors.
Density of Roads on Unstable Slopes (km/Hectare)	0.38	1.12	0.75	0.74	2.80%	Since this factor is weighted by the landslide potential classes, the amount of Class 5 acreage crossed by roads is a significant component of the PW outcome.

EMDS Categories	Low Breakpoint (~1.3 Standard Deviations)	High Breakpoint (~1.3 Standard Deviation)	Average Value	Breakpoint Range	Model Percentage weight	Comments
Density of Road-related gullies					2.70%	No data entered, requires field validation. The number of gullies observed by CGS was significant, especially in the soft terrain type, however that information could not be used because gully causation cannot be reliably determined from aerial photographs.
Road Surface type					2.70%	No data entered, requires field validation. Road surface type information is incomplete, although selected areas do have comprehensive information available.
Density of In-Stream Timber Harvest Landings					5.60%	No data, requires extensive aerial photograph review, modeling, and/or field validation.

Although the breakpoints for land use activities were delineated based on mass-wasting and surface erosion categories, a summary table for the percentage weights for land use follows:

Table 10: EMDS Land use model percentage weights.

Land Use Processes Category Acreages within each category is weighted by the landslide potential class	Mass-wasting	Surface erosion	Model percentage weight
Percentage of the planning watershed (PW) area in high density buildings and pavement	1.7%	1.7%	3.4%
Percentage of the PW area in intensive crop cultivation	1.7%	1.7%	3.4%
Percentage of the PW area Tractor logged 2000-present	1.7%	2.5%	4.2%
Percentage of the PW area Tractor logged 1990-1999	1.0%	1.7%	2.7%
Percentage of the PW area Tractor logged 1973-1989	0.5%		0.5%
Percentage of the PW area Tractor logged 1945-1972	1.0%		1.0%
Percentage of the PW area used for grazing livestock	0.8%	0.8%	1.6%

One concern in examining the results of the model is the large numbers of empty categories. The empty categories total just over one quarter of the model weights. In the natural processes section, these categories account for one-third of the inputs or about 16.7% of the total weight while in the land-use section, empty categories account for about 22 percent of the inputs, or about 11 percent of the total weight. Since these empty placeholders remain in the weighting in the final processing of the model data, the empty category tends to move the summary natural processes, land use, and all sediment sources combined results towards the mid-range of the potential suitability scale. The results also mix actual inputs (slides delivering sediment to watercourses) and potential inputs (slides not delivering to watercourses) and expected inputs (estimated contributions of sediment based on landslide potential and land use). The model does not readily capture temporal inputs or spatial redistribution of sediment downstream.

Additional Summary Data

There are many tables in the synthesis report for the Mattole that summarize land use and vegetation data at the planning watershed level. The tables below provide additional information that might prove useful to land managers or analysts.

Table 11: Planning Watershed Ownership Pattern

	PUBLIC	AG/TIMBER	OTHER
Basin-Wide:	32,890	118,981	37,917
Subbasin:			
Northern:	829	59,447	3,278
Western:	26,682	23,807	7,280
Eastern:	2,897	26,584	21,300
Southern:	2,482	9,129	6,059
Northern Subbasin			
Apple Tree:	0	3,761	153
Camp Mattole:	150	6,272	531
Cow Pasture Opening:	1	5,529	1,075
Joel Flat:	0	4,995	0
Long Ridge:	0	6,348	309
McGinnis Creek:	0	4,649	38
Oil Creek:	70	8,755	7
Petrolia:	362	3,690	999
Rainbow:	41	7,112	38
Rattlesnake Creek:	204	8,335	128
Western Subbasin:			
Big Finley Creek:	3,374	1,513	1,043
Honeydew Creek:	7,817	3,280	1,015
N. F. Bear Creek:	3,633	3,506	1,231
S. F. Bear Creek:	5,034	0	487
Shenanigan Ridge	1,860	5,762	2,293
Squaw Creek:	3,999	6,084	722
Woods Creek:	966	3,662	489
Eastern Subbasin:			
Blue Slide Creek:	0	1,268	5,172
Dry Creek:	266	4,097	2,954
Eubank Creek:	38	2,144	5,796
Mattole Canyon:	1,356	4,022	5,118
Sholes Creek:	245	9,660	1,421
Westland Creek:	991	5,394	839
Southern Subbasin:			
Bridge Creek:	1,342	4,377	4,500
Thompson Creek:	1,141	4,753	1,559

Table 12: Subbasin Riparian Vegetation

Riparian Vegetative Conditions (within 150' of streams)												
Area	Vegetation Type											
	Conifer		**Mixed**		**Hardwood**		**Grassland**		**Barren**		**Other**	
	Acres	% of Area	Acres	% of Area	Acres	% of Area	Acres	% of Area	Acres	% of Area	Acres	% of Area
Basin-wide:	2,715	11%	15,144	62%	3,618	15%	1,341	5%	1,217	5%	435	2%
Northern Subbasin:	788	10%	4,112	53%	1,314	17%	805	10%	512	7%	215	3%
Western Subbasin:	1,170	15%	4,525	58%	1,271	16%	249	3%	357	5%	202	3%
Eastern Subbasin:	586	9%	4,558	70%	731	11%	254	4%	347	5%	18	<1%
Southern Subbasin:	171	7%	1,949	79%	302	12%	32	1%	1	<1%	1	<1%

Table 13: Planning Watershed Riparian Vegetation

Covertype refers to the broad classification of vegetation such as hardwood, conifer, and grassland. Vegtype is the specific vegetation within the covertype classification, thus a hardwood covertype may be comprised of tan-oak, live oak, mixed riparian hardwoods, or other hardwood plant communities. The key to the abbreviations follows in Table 11.

Riparian Vegetative Conditions (within 150' of streams) **Acres of vegetation by Cover Type and Vegetation Type**			
Planning Watershed	CALVEG 2000 Field		
	COVERTYPE	**VEGTYPE**	**VEGTYPE2**
NORTHERN SUBBASIN			
Apple Tree:	MIX=295	DF=295	QT=186, TX=48, QB=45, NX=16
	HDW=112	QT=53, QB=36, NX=16, TX=4, NR=3	
	HEB=55	HG=55	
	CON=27	DF=27	
	BAR=19	BA=19	
	OTHER=1	NC=0.42, WL=0.39	
Camp Mattole:	MIX=416	DF=415	QT=192, QB=127, TX=79, QG=13, NX=4, NR=0.29, QH=0.23
		PM=0.37	QB=0.37
	HDW=211	QB=140, TX=20, QT=17, QG=12, NR=11, QC=8, NX=2, QX=2, QH=0.01	
	HEB=160	HG=160	
	BAR=147	BA=147	
	CON=37	DF=37	
	OTHER=21	WA=8, AG=7, NC=4, WL=1, CK=0.01	
Cow Pasture Opening:	HDW=381	QB=239, QT=64, TX=30, NR=27, NX=13, QO=4, QX=4, QC=2	
	MIX=359	DF=359	QT=173, QB=156, TX=23, NX=6
	HEB=147	HG=147	
	BAR=37	BAR=37	
	OTHER=28	AG=15, CK=7, NC=4, WL=2, UB=0.11	
	CON=3	DF=3	
Joel Flat:	MIX=278	DF=278	QB=225, QT=49, TX=4
	HDW=126	QB=84, QO=19, QT=19, NX=3, TX=2	
	HEB=89	HG=89	
	OTHER=29	CK=15, WL=10, AG=4, CQ=0.14	
	BAR=27	BA=27	
	CON=12	DF=12	

Riparian Vegetative Conditions (within 150' of streams) Acres of vegetation by Cover Type and Vegetation Type			
Planning Watershed	CALVEG 2000 Field		
	COVERTYPE	**VEGTYPE**	**VEGTYPE2**
NORTHERN SUBBASIN			
Long Ridge:	MIX=484	DF=484	QT=409, QB=52, TX=13, QG=9
	CON=132	DF=132	
	HDW=53	QT=27, QB=15, QG=4, TX=4, NX=3	
	HEB=30	HG=30	
	OTHER=5	WL=3, CK=2	
	BAR=0.09	BA=0.09	
McGinnis Creek:	MIX=351	DF=351	QT=273, QB=75, TX=3
	HDW=87	QT=48, QB=37, TX=1, NX=0.16	
	BAR=65	BA=65	
	CON=42	DF=42	
	HEB=14	HG=14	
	OTHER=9	WA=9, WL=0.39, AG=0.10	
Oil Creek:	MIX=643	DF=643	QT=534, TX=75, QB=29, QG=5, QC=1
	HDW=113	QT=42, TX=34, QG=32, QB=4, QC=1, NX=0.40	
	CON=110	DF=110	
	HEB=93	HG=93	
	BAR=60	BA=60	
	OTHER=0		
Petrolia:	HEB=152	HG=152	
	MIX=122	DF=122	QB=73, QO=29, QR=13, QT=5, TX=1, NR=0.23
	BAR=112	BA=112	
	OTHER=112	WA=40, CK=38, WL=19, AG=11, NC=4	
	HDW=100	QO=29, QR=29, NR=22, QX=11, QB=5, NX=4	
	CON=82	DF=82	
Rainbow:	MIX=523	DF=523	QT=496, TX=12, NX=10, QB=4, QG=2
	CON=262	DF=262	
	HDW=55	QT=33, QG=9, QB=6, NX=3, TX=3	
	HEB=23	HG=23	
	OTHER=2	CQ=2	
	BAR=0		

Riparian Vegetative Conditions (within 150' of streams) Acres of vegetation by Cover Type and Vegetation Type			
Planning Watershed	CALVEG 2000 Field		
	COVERTYPE	**VEGTYPE**	**VEGTYPE2**
NORTHERN SUBBASIN			
Rattlesnake Creek:	MIX=641	DF=641	QT=480, TX=103, QG=26, QC=25, NX=5, QB=2
		RD=0.08	QT=0.08
	CON=80	DF=80	
	HDW=78	TX=22, QG=18, NX=13, QC=9, QT=8, QB=7	
	BAR=45	BA=45	
	HEB=41	HG=41	
	OTHER=7	WA=7, WL=0.29, CQ=0.03	
WESTERN SUBBASIN			
Big Finley Creek:	MIX=481	DF=481	QT=441, QC=24, TX=14, QB=1, QG=1
	CON=134	DF=134	
	HDW=159	QT=154, TX=4, QC=1	
	HEB=10	HG=10	
	BAR=4	BA=4	
	OTHER=0		
Honeydew Creek:	MIX=1029	DF=1029	QT=865, TX=96, QC=47, QB=20
	CON=262	DF=262	
	HDW=215	QT=72, QC=40, TX=32, QB=31, NX=12, QG=12, QH=7, NR=5, QO=4	
	HEB=70	HG=70	
	BAR=39	BA=39	
	OTHER=33	CQ=14, WA=7, WL=6, CS=4, AG=2, NC=0.42, CK=0.05	
North Fork Bear Creek:	MIX=892	DF=892	QT=727, QC=80, TX=79, NR=3, QB=3, QG=0.09
	CON=233	DF=233	
	HDW=31	QT=25, TX=4, QB=2	
	OTHER=11	AG=11	
	BAR=9	BA=9	
	HEB=5	HG=5	

Riparian Vegetative Conditions (within 150' of streams) Acres of vegetation by Cover Type and Vegetation Type			
Planning Watershed	CALVEG 2000 Field		
	COVERTYPE	**VEGTYPE**	**VEGTYPE2**
WESTERN SUBBASIN			
South Fork Bear Creek:	MIX=432	DF=432	QT=419, QC=13, TX=0.29
	CON=243	DF=243	
	HDW=76	QT=72, NR=5	
	OTHER=8	SC=4, CS=3, NC=1	
	HEB=1	HG=1	
	BAR=0		
Shenanigan Ridge:	MIX=611	DF=570	QT=465, QB=45, TX=23, NR=17, QR=14, QH=5
		DG=41	QR=38, QT=4
	HDW=248	QT=119, QB=50, QR=48, QO=18, QM=8, TX=2, QH=1, QX=1, NR=0.01	
	BAR=181	BA=175, DU=6	
	CON=115	DF=61, DG=54	
	OTHER=88	WA=29, WL=20, CK=14, AG=12, NC=11, UB=2	
	HEB=41	HG=41	
Squaw Creek:	MIX=756	DF=755	QT=672, QB=55, QC=17, TX=8, QG=3, NR=1
		PM=1	QB=1
	HDW=457	QT=306, QB=119, QH=19, QC=10, TX=2, QG=1	
	CON=175	DF=175	
	HEB=65	HG=65	
	OTHER=9	AG=9	
	BAR=5	BA=5	
Woods Creek:	MIX=325	DF=325	QT=262, TX=31, NX=11, QG=10, QB=4, NR=3, QH=3
	BAR=119	BA=119	
	HDW=85	QT=29, QB=17, TX=16, QM=9, NR=5, QG=5, NX=4, QH=0.12	
	HEB=58	HG=58	
	OTHER=54	NC=23, WA=20, AG=8, CK=2, WL=0.24	
	CON=8	DF=8	

Riparian Vegetative Conditions (within 150' of streams) Acres of vegetation by Cover Type and Vegetation Type			
Planning Watershed	CALVEG 2000 Field		
	COVERTYPE	**VEGTYPE**	**VEGTYPE2**
EASTERN SUBBASIN			
Blue Slide Creek:	MIX=692	DF=678	QT=578, TX=80, QC=12, QG=6, QB=2
		JP=14	QT=9, QG=3, TX=3
	HDW=128	QT=74, TX=32, QG=19, QC=2	
	HEB=70	HG=70	
	BAR=3	BA=3	
	CON=1	DF=1	
	OTHER=0		
Dry Creek:	MIX=620	DF=620	QT=498, TX=58, QB=49, QC=10, QG=6
	BAR=59	BA=59	
	HDW=44	QC=22, QT=19, QB=3	
	CON=35	DF=35	
	HEB=10	HG=10	
	OTHER=7	CQ=4, WL=2	
Eubank Creek:	MIX=802	DF=802	QT=722, TX=59, QC=14, QB=6, QG=0.01
	HDW=258	QT=193, TX=65, QG=1	
	BAR=59	BA=59	
	HEB=41	HG=41	
	CON=26	DF=26	
	OTHER=0.21	SC=0.18, UB=0.03	
Mattole Canyon:	MIX=809	DF=807	QT=691, TX=76, QB=17, QC=12, QG=11
		JP=1	TX=1
	HDW=169	QT=55, QG=48, QC=40, TX=24, QB=2, QK=0.09	
	CON=162	DF=161, MD=1	
	HEB=81	HG=81	
	BAR=80	BA=80	
	OTHER=7	CL=7	

Riparian Vegetative Conditions (within 150' of streams) Acres of vegetation by Cover Type and Vegetation Type			
Planning Watershed	CALVEG 2000 Field		
	COVERTYPE	**VEGTYPE**	**VEGTYPE2**
EASTERN SUBBASIN			
Sholes Creek:	MIX=1009	DF=1009	QT=895, TX=64, QB=46, QG=3, QC=2
	CON=171	DF=171	
	BAR=158	BA=158	
	HDW=99	QT=55, TX=24, QB=19, QG=0.03	
	HEB=38	HG=38	
	OTHER=3	CQ=3, WL=0.25	
Westland Creek:	MIX=626	DF=626	QT=457, TX=91, QB=63, QC=10, QG=5
	CON=191	DF=191	
	BAR=41	BA=41	
	HDW=33	QT=14, QG=12, TX=3, QB=2, QC=2	
	HEB=14	HG=14	
	OTHER=0		
SOUTHERN SUBBASIN			
Bridge Creek:	MIX=1216	DF=1042	QT=972, TX=69, QB=1
		RD=174	QT=146, TX=29
	HDW=136	QT=109, TX=27	
	CON=85	DF=64, RD=17, RW=4	
	HEB=27	HG=27	
	OTHER=1	SC=1	
	BAR=0		
Thompson Creek:	MIX=733	DF=496	QT=453, TX=43
		RD=237	QT=203, TX=23, QR=11
	HDW=166	QT=164, QE=3	
	CON=86	RD=62, DF=24	
	HEB=5	HG=5	
	BAR=1	BA=1	
	OTHER=0		

Table 14: CALVEG2000 Data Library

==

Statewide Calveg Codes as of the 31st of January 2002.
Types in *italics* have not been mapped.

CV	Common Name	Covertype	St. Code

Covertype/Lifeform

CV	Common Name	Covertype	St. Code
CON	General Conifer	CON	1
SHB	General Shrub	SHB	2
BAR	Barren Soil/Rock	BAR	3
HDW	General Hardwood	HDW	4
HEB	Wet Grass/Herbs	HEB	5
HEB	Dry Grass/Herbs	HEB	6
WAT	Water, Fresh and Salt	WAT	7
MIX	General Mixed Conifer/Hardwood	MIX	8
BAR	Snow/Ice	BAR	9
AGR	Agriculture	AGR	10
URB	Urban/Developed	URB	11
NNA	Urban Vegetation/Ornamental	NNA	12
XXX	Unknown/Does Not Compute	XXX	99

Conifer Types (100 + x, where x = 20-99)

CV	Common Name	Covertype	St. Code
AA	*Noble Fir*	*CON*	*120*
AB	Santa Lucia Fir	CON	121
BP	Bristlecone Pine	CON	122
BT	Big Tree (Sequoiadendron giganteum)	CON	123
DF	Pacific Douglas-fir	CON	124
DG	Douglas-fir—Grand Fir	CON	125
DM	Bigcone Douglas-fir	CON	126
DP	Douglas-fir—Ponderosa Pine	CON	127
DW	Douglas-fir—White Fir	CON	128
EA	*Engelmann Spruce*	*CON*	*129*
EP	Eastside Pine	CON	130
FP	Foxtail Pine	CON	131
GF	Grand Fir	CON	132
JP	Jeffrey Pine	CON	133
JU	Utah Juniper	CON	134
KP	Knobcone Pine	CON	135
LP	Lodgepole Pine	CON	136

MA	*Alaska Yellow-Cedar*	*CON*	*137*
MB	Mixed Conifer-Giant Sequoia	CON	138
MC	Cuyamaca Cypress	CON	139
MD	*Incense-Cedar*	*CON*	*140*
MF	Mixed Conifer Fir	CON	141
MG	*Gowen Cypress*	*CON*	*142*
MH	Mountain Hemlock	CON	143
MI	*Piute Cypress*	*CON*	*144*
MK	Klamath Mixed Conifer	CON	145
MM	Monterey Cypress	CON	146
MN	McNab Cypress	CON	147
MO	*Baker Cypress*	*CON*	*148*
MP	Mixed Conifer Pine	CON	149
MS	Sargent Cypress	CON	150
MT	Tecate Cypress	CON	151
MU	Ultramafic Mixed Conifer	CON	152
MY	Pygmy Cypress	CON	153
MZ	*Santa Cruz Cypress*	*CON*	*154*
PB	*Brewer Spruce*	*CON*	*155*
PC	Coulter Pine	CON	156
PD	Foothill Grey Pine	CON	157
PJ	Singleleaf Pinyon Pine	CON	158
PL	Limber Pine	CON	159
PM	Bishop Pine	CON	160
PO	Port Orford-Cedar	CON	161
PP	Ponderosa Pine	CON	162
PQ	Fourneedle Pinyon Pine	CON	163
PR	Monterey Pine	CON	164
PS	Shore Pine	CON	165
PT	Torrey Pine	CON	166
PW	Ponderosa Pine—White Fir	CON	167
RD	Redwood—Douglas-Fir	CON	168
RF	Red Fir	CON	169
RW	Redwood	CON	170
SA	Subalpine Conifers	CON	171
SG	Sitka Spruce—Grand Fir	CON	172
SK	Sitka Spruce	CON	173
SR	Sitka Spruce—Redwood	CON	174
WB	Whitebark Pine	CON	175
WF	White Fir	CON	176
WH	*Western Hemlock*	*CON*	*177*
WJ	Western Juniper	CON	178
WP	Washoe Pine	CON	179
WW	Western White Pine	CON	180
XC	*Unknown Conifer*	*CON*	*199*

Hardwood Types (400 + x, where x = 1-99)

ET	*Elephant Tree*	*HDW*	*401*
FM	*Curlleaf Mountain Mahogany*	*HDW*	*402*
NR	Mixed Riparian Hardwood	HDW	403
NX	Non-productive Mixed Hardwood	HDW	404
Q1	Live Oak—Madrone	HDW	405
QA	Coastal Live Oak	HDW	406
QB	California Bay	HDW	407
QC	Canyon Live Oak	HDW	408
QD	Blue Oak	HDW	409
QE	White Alder	HDW	410
QF	Fremont Cottonwood	HDW	411
QG	Oregon White Oak	HDW	412
QH	Pacific Madrone	HDW	413
QI	California Buckeye	HDW	414
QJ	Cottonwood—Alder	HDW	415
QK	California Black Oak	HDW	416
QL	Valley Oak	HDW	417
QM	Bigleaf Maple	HDW	418
QN	Engelmann Oak	HDW	419
QO	Willow	HDW	420
QP	California Sycamore	HDW	421
QQ	Quaking Aspen	HDW	422
QR	Red Alder	HDW	423
QS	Willow—Aspen	HDW	424
QT	Tanoak	HDW	425
QV	Black Walnut	HDW	426
QW	Interior Live Oak	HDW	427
QX	Black Cottonwood	HDW	428
QY	Willow—Alder	HDW	429
QZ	Eucalyptus	HDW	430
TC	Tree Chinquapin	HDW	431
TX	Productive Mixed Hardwood	HDW	432
UD	Desert Willow	HDW	433
UI	*Desert Ironwood*	*HDW*	*434*
UJ	Joshua Tree	HDW	435
UL	Catclaw Acacia	HDW	436
UM	Mesquite	HDW	437
UP	Palo Verde	HDW	438
UT	Tamarisk	HDW	439
UW	Fan Palm	HDW	440
UX	Smoke Tree	HDW	441
WD	*Dogwood*	*HDW*	*442*
XH	*Unknown Hardwood*	*HDW*	*499*

Mixed Types

A mixed type consists of a primary vegetation code (conifer), combined with a secondary vegetation code (hardwood). As each of the lifeform suites consist of a numerical code ranging from one to ninety-nine prefaced with its lifeform code (1-14), a mixed code is created by combining the two codes, conifer code first, sans their lifeform preface. For example, a mixed call of Ponderosa Pine/Black Oak (codes 162, 416 respectively) would be noted numerically as code 6216. Thus, all the Ponderosa Pine mixtures can easily be determined by selecting all mixed codes starting with "62".

Mixed Examples:
DF—QT (old DT type), 124 & 425 = 2425
EP—NR, 130 & 403 = 3003
MP—QC, 149 & 408 = 4908
PD—QD, 157 & 409 = 5709
RW—QR, 170 & 423 = 7023

Taken one further step in plantation situations where shrub types are the secondary code, the code becomes six places long, with the conifer code assuming the first two places, hardwood the second pair, and shrub the last (cchhss). As hardwood is not present, its place is held by two zeroes. For example, a plantation of red fir and huckleberry oak would have a code of 690018.

Shrub Types

AD	White Bursage	SHB	201
AN	Mendocino Manzanita	SHB	202
AX	Mixed Alpine Scrub	SHB	203
BB	Bitterbrush	SHB	204
BC	Saltbrush	SHB	205
BG	*Black Greasewood*	*SHB*	*206*
BL	Low Sagebrush	SHB	207
BM	Curlleaf Mountain Mahogany	SHB	208
BR	Rabbitbrush	SHB	209
BS	Basin Sagebrush	SHB	210
BX	High Desert Mixed Shrub	SHB	211
C1	Ultramafic Mixed Shrub	SHB	212
CA	Chamise	SHB	213
CB	Salal—California Huckleberry Shrub	SHB	214
CC	Ceanothus Chaparral	SHB	215
CD	Southern Mixed Chaparral	SHB	216
CG	Greenleaf Manzanita	SHB	217
CH	Huckleberry Oak	SHB	218
CI	*Deerbrush*	*SHB*	*219*
CJ	Brewer Oak	SHB	220
CK	Coyote Brush	SHB	221

CL	Wedgeleaf Ceanothus	SHB	222
CM	Upper Montane Mixed Shrub	SHB	223
CN	Pinemat Manzanita	SHB	224
CQ	Northern Mixed Shrub	SHB	225
CR	Red Shanks Chaparral	SHB	226
CS	Scrub Oak	SHB	227
CT	Tucker Scrub Oak	SHB	228
CV	Snowbrush	SHB	229
CW	Whiteleaf Manzanita	SHB	230
CX	Montane Mixed Chaparral	SHB	231
CZ	Semi-Desert Chaparral	SHB	232
DA	Blackbush	SHB	233
DB	Desert Buckwheat	SHB	234
DC	Cholla	SHB	235
DD	*Croton*	*SHB*	*236*
DE	Arrowweed	SHB	237
DO	Ocotillo	SHB	238
DL	Creosote Bush	SHB	239
DS	*Shadescale*	*SHB*	*240*
DV	Mixed Desert Succulent	SHB	241
DX	Mixed Desert Scrub	SHB	242
HS	Cheesebush	SHB	243
JC	California Juniper	SHB	244
LS	Scalebroom	SHB	245
ML	Baccharis (riparian)	SHB	246
NB	Mixed Desert Wash Scrub	SHB	247
NC	North Coastal Mixed Shrub	SHB	248
RS	Alluvial Fan Sage Scrub	SHB	249
SB	Buckwheat	SHB	250
SC	Blueblossom Ceanothus	SHB	251
SD	Manzanita Chaparral	SHB	252
SE	Encelia Scrub	SHB	253
SH	Coastal Bluff Scrub	SHB	254
SL	Coastal Lupine	SHB	255
SM	Sumac Shrub	SHB	256
SO	Coastal Cactus	SHB	257
SP	*Sage*	*SHB*	*258*
SQ	Soft Scrub-Chaparral Mix	SHB	259
SS	California Sagebrush	SHB	260
TA	Mountain Alder	SHB	261
TM	Cottonthorn	SHB	262
WL	*Willow (riparian scrub)*	*SHB*	*263*
WM	Birchleaf Mountain Mahogany	SHB	264
XS	*Unknown Shrub*	*SHB*	*299*

Barren Types

BA	General Barren	BAR	301
DU	Dune	BAR	302

Wet Herbaceous/Grass Types (500 + x, where x = 1-99)

HC	Pickleweed-Cord Grass	HEB	501
HJ	Wet Grass/Herbs	HEB	502
HT	Tule-Cattail	HEB	503
XJ	*Unknown Wet Herbaceous/Grass*	*HEB*	*599*

Dry Herbaceous/Grass Types (600 + x, where x = 1-99)

AC	Cushion Plant	HEB	601
HG	Dry Grass/Herbs	HEB	602
HM	Perennial Herbs (Mulesear et. al.)	HEB	603
XG	*Unknown Grass/Herbs*	*HEB*	*699*

Water Types

WA	General Water	WAT	701

Snow Types

SN	General Snow/Ice	BAR	901

Agriculture Types

AG	General Agriculture	AGR	1001

Urban Types

UB	General Urban	URB	1101

Urban/Non-Native Vegetation

IA	Giant Reed	HEB	1201
IC	Non-native/Ornamental Conifer	CON	1202
IG	Non-native/Ornamental Grass	HEB	1203
IH	Non-native/Ornamental Hardwood	HDW	1204
IM	Non-native/Ornamental Conifer/Hardwood Mixture	MIX	1205
IS	Non-native/Ornamental Shrub	SHB	1206
XI	*Unknown Urban/Non-native Vegetation*	*NNA*	*1299*

Unmapped

	Area not currently mapped	*NYM*	*9999*

Integrated Analysis Reference Data

CDF NCWAP developed the following summary tables to help identify and highlight how current patterns of vegetation and land use are expressed in relation to the geology of the watershed. These patterns are explored by examining the current vegetation and recent timber harvesting in relation to their occurrence in landslide potential classes, the product of a model that uses terrain type, vegetation and landslides as variables. Landslide causality was not assigned and recent timber harvest activity has occurred in low percentages in most of the planning watersheds. The significance of the geologic characteristics in these tables is expressed as a relative rating and is not characterized numerically.

Due to time constraints in processing and presenting data, some of the final geology-based area acreage calculations may differ slightly from CGS numbers presented in the Main report and their appendix document. For the most part, the area columns have been left blank although differences were small and do not affect percentage totals.

Table 14: Data Summary Table for the Northern Subbasin.

Factor	Northern Subbasin Planning Watersheds									
	Apple Tree		Camp Mattole		Cow Pasture		Joel Flat		Long Ridge	
Relative Landslide Potential[1]		% area		% area		% area		% area		% area
Very Low		0.7%		4.9%		4.9%		0.7%		0.2%
Low		1.0%		3.7%		2.4%		2.5%		1.5%
Moderate		10.0%		11.8%		10.4%		9.2%		8.9%
High		13.2%		9.8%		11.6%		12.8%		14.6%
Very High		12.9%		12.8%		12.3%		13.4%		12.2%
High/Very High Subtotal		*26.1%*		*22.6%*		*23.9%*		*26.1%*		*26.9%*
GRAND TOTAL		**38%**		**43%**		**42%**		**39%**		**37%**
Landslide and Selected Geomorphic Features[2]		% area		% area		% area		% area		% area
Historically Active Landslide Features Total		**2.6%**		**1.6%**		**0.9%**		**3.1%**		**4.6%**
Earthflow		1.7%		0.7%		0.2%		2.1%		2.8%
Rock Slide		0.2%		0.1%		0.2%		0.4%		0.8%
Debris Slide		0.7%		0.8%		0.3%		0.5%		0.9%
Debris Flow		0.1%		0.0%		0.2%		0.0%		0.0%
Dormant Landslide Features Total		**22.0%**		**4.3%**		**8.6%**		**12.3%**		**11.4%**

Factor	Northern Subbasin Planning Watersheds									
	Apple Tree		**Camp Mattole**		**Cow Pasture**		**Joel Flat**		**Long Ridge**	
Selected Geomorphic Features Total		**7.5%**		**15.9%**		**7.0%**		**10.3%**		**8.5%**
Disrupted Ground		2.5%		5.2%		1.3%		4.0%		4.5%
Debris Slide Slope		4.7%		9.6%		5.7%		5.5%		3.5%
Inner Gorge (area)[3]		0.4%		1.1%		0.0%		0.8%		0.6%
Total of All Above Features		**32.1%**		**21.7%**		**16.5%**		**25.6%**		**24.6%**
Timber Harvest 1990 -2000	acres	% area	acres	% area	acres	% area	acres	% area	acres	% area
Silviculture[4] Category 1										
Tractor			19	0.1%			23	0.2%	136	0.8%
Cable			82	0.5%					58	0.3%
Helicopter			43	0.3%					2	0.0%
TOTAL	**0**	**0.0%**	**144**	**0.9%**	**0**	**0.0%**	**23**	**0.2%**	**196**	**1.1%**
Silviculture Category 2										
Tractor	6	0.1%			172	1.1%			306	1.7%
Cable									135	0.8%
Helicopter									5	0.0%
TOTAL	**6**	**0.1%**	**0**	**0.0%**	**172**	**1.1%**	**0**	**0.0%**	**446**	**2.5%**
Silviculture Category 3										
Tractor			41	0.3%			5	0.0%	126	0.7%
Cable			18	0.1%						
Helicopter									66	0.4%
TOTAL	**0**	**0.0%**	**59**	**0.4%**	**0**	**0.0%**	**5**	**0.0%**	**192**	**1.1%**
TOTAL	**6**	**0.1%**	**203**	**1.3%**	**172**	**1.1%**	**28**	**0.2%**	**834**	**4.7%**
Other Land Uses	acres	% area	acres	% area	acres	% area	acres	% area	acres	% area
Grazing	1,093.4	10.5%	2,102.4	13.0%	1,548.6	9.8%	2,558.9	19.8%	1,512.2	8.5%
Agriculture			79.3	0.5%	115.0	0.7%	17.9	0.1%		
Development					11.9	0.1%				
Timberland, No Recent Harvest	2,531	24.4%	2,954	18.3%	2,888	18.2%	1,702	13.2%	3,855	21.7%
TOTAL	**3,624**	**34.9%**	**5,136**	**31.7%**	**4,564**	**28.8%**	**4,279**	**33.2%**	**5,367**	**30.3%**
Roads										

Factor	Northern Subbasin Planning Watersheds									
	Apple Tree		Camp Mattole		Cow Pasture		Joel Flat		Long Ridge	
Road Density (miles/sq. mile)	3.5		3.8		4.5		3.8		3.7	
Density of Road Crossings (#/stream mile)	0.5		0.3		1.0		1.0		0.6	
Roads within 200' of Stream (miles/stream mile)	0.2		0.1		0.2		0.1		0.1	
Streams	% stream length		% stream length		% stream length		% stream length		% stream length	
% Stream by Gradient										
< 1% (Response Reach)		18.0%		24.0%		4.0%		6.0%		4.0%
1-4% (Response Reach)		18.0%		13.0%		26.0%		14.0%		20.0%
4-20% (Transport Reach)		25.0%		38.0%		45.0%		74.0%		16.0%
>20% (Source Reach)		39.0%		25.0%		25.0%		6.0%		60.0%
Historically Active and Dormant Landslide and Selected Geomorphic Features[6]	% area	% stream length	% area	% stream length	% area	% stream length	% area	% stream length	% area	% stream length
Within 180' of Blue Line Stream	39.5%	22.6%	19.2%	66.3%	15.7%	2.1%	33.2%	57.9%	35.2%	49.1%

1 Refer to California Geological Survey appendix for landslide map (Plate 1), relative landslide potential map (Plate 2) and description.
2 This category includes only large polygon slides and does not include point slides.
3 Area based on inner gorges captured as polygons plus inner gorges captured as linear features, which are treated as having an average width of 100 feet.
4 Category 1 includes clear-cut, rehab, seed tree step, and shelterwood seed step prescriptions; Category 2 includes shelter wood prep step, shelterwood removal step, and alternative prescriptions; Category 3 includes selection, commercial thin, sanitation salvage, transition, and seed tree removal step prescriptions.
5 Landslide features and selected geomorphic features include earth flow, rock slide, debris slide, debris flow, debris slide slopes, disrupted ground, eroding banks and inner gorges.

Factor	Northern Subbasin Planning Watersheds									
	McGinnis Creek		Oil Creek		Petrolia		Rainbow		Rattlesnake Cr.	
Relative Landslide Potential[1]		% area		% area		% area		% area		% area
Very Low		1.6%		0.6%		13.4%		0.2%		1.2%
Low		3.0%		2.1%		4.0%		3.0%		2.3%
Moderate		13.5%		7.1%		13.4%		15.7%		11.1%
High		8.2%		12.7%		12.8%		11.1%		10.5%
Very High		14.6%		15.0%		5.8%		10.7%		**14%**
High/Very High Subtotal		*22.8%*		*27.7%*		*18.6%*		*21.8%*		*25%*
GRAND TOTAL		**41%**		**38%**		**49%**		**41%**		**39%**
Landslide and Selected Geomorphic Features[2]		% area		% area		% area		% area		% area
Historically Active Landslide Features Total		**3.0%**		**4.0%**		**2.0%**		**2.6%**		**5.1%**

Factor	Northern Subbasin Planning Watersheds									
	McGinnis Creek		Oil Creek		Petrolia		Rainbow		Rattlesnake Cr.	
Earthflow		1.6%		3.0%		1.2%		1.3%		1.9%
Rock Slide		0.6%		0.1%		0.8%		0.2%		0.6%
Debris Slide		0.7%		0.9%		0.0%		1.0%		2.7%
Debris Flow		0.1%		0.0%		0.0%		0.1%		0.0%
Dormant Landslide Features Total		**5.9%**		**10.8%**		**6.9%**		**8.3%**		**12.3%**
Selected Geomorphic Features Total		**15.9%**		**16.1%**		**6.6%**		**12.0%**		**18.0%**
Disrupted Ground		0.8%		3.3%		5.3%		2.9%		3.0%
Debris Slide Slope		14.0%		11.5%		0.7%		8.4%		13.5%
Inner Gorge (area)[3]		1.1%		1.3%		0.7%		0.7%		1.5%
Total of All Above Features		**24.8%**		**30.9%**		**15.6%**		**22.9%**		**35.4%**
Timber Harvest 1990 -2000	acres	% area	acres	% area	acres	% area	acres	% area	acres	% area
Silviculture[4] Category 1										
Tractor	69	0.6%	58	0.2%			22	0.1%	53	0.2%
Cable	171	1.5%	22	0.1%			84	0.5%	29	0.1%
Helicopter	3	0.0%	96	0.4%			71	0.4%	38	0.2%
TOTAL	**243**	**2.1%**	**176**	**0.7%**	**0**	**0.0%**	**177**	**1.0%**	**120**	**0.5%**
Silviculture Category 2										
Tractor					20	0.2%	3	0.0%	106	0.5%
Cable							30	0.2%	6	0.0%
Helicopter							1	0.0%		
TOTAL	**0**	**0.0%**	**0**	**0.0%**	**20**	**0.2%**	**34**	**0.2%**	**112**	**0.5%**
Silviculture Category 3										
Tractor	25	0.2%	268	1.1%			61	0.3%	80	0.4%
Cable	5	0.0%	370	1.6%			27	0.2%	15	0.1%
Helicopter							3	0.0%	102	0.5%
TOTAL	**30**	**0.3%**	**638**	**2.7%**	**0**	**0.0%**	**91**	**0.5%**	**197**	**0.9%**
TOTAL	**272**	**2.4%**	**814**	**3.5%**	**20**	**0.2%**	**302**	**1.7%**	**429**	**2.0%**
Other Land Uses	acres	% area	acres	% area	acres	% area	acres	% area	acres	% area
Grazing	534.4	4.7%	2,386.4	10.1%	2,172.8	21.3%	1,188.8	6.7%	1,183.8	5.4%

Factor	Northern Subbasin Planning Watersheds									
	McGinnis Creek		Oil Creek		Petrolia		Rainbow		Rattlesnake Cr.	
Agriculture					151.3	1.5%				
Development					9.1	0.1%				
Timberland, No Recent Harvest	3,201	27.9%	4,836	20.6%	1,173	11.5%	5,569	31.6%	6,126	27.9%
TOTAL	**3,735**	**32.6%**	**7,222**	**30.7%**	**3,506**	**34.3%**	**6,758**	**38.3%**	**7,310**	**33.2%**
Roads										
Road Density (miles/sq. mile)	3.3		3.3		3.3		2.3		4.1	
Density of Road Crossings (#/stream mile)	0.4		0.5		0.7		0.1		0.6	
Roads within 200' of Stream (miles/stream mile)			0.1		0.1				0.1	
Streams	% stream length		% stream length		% stream length		% stream length		% stream length	
% Stream by Gradient										
< 1% (Response Reach)		15.0%		8.0%		40.0%		0.0%		6.0%
1-4% (Response Reach)		23.0%		15.0%		29.0%		9.0%		10.0%
4-20% (Transport Reach)		37.0%		39.0%		24.0%		56.0%		52.0%
>20% (Source Reach)		25.0%		38.0%		7.0%		34.0%		32.0%
Historically Active and Dormant Landslide and Selected Geomorphic Features[6]	% area	% stream length	% area	% stream length	% area	% stream length	% area	% stream length	% area	% stream length
Within 180' of Blue Line Stream	25.8%	73.2%	39.8%	88.5%	17.6%	33.2%	25.3%	44.6%	44.0%	111.8%

1 Refer to California Geological Survey appendix for landslide map (Plate 1), relative landslide potential map (Plate 2) and description.
2 This category includes only large polygon slides and does not include point slides.
3 Area based on inner gorges captured as polygons plus inner gorges captured as linear features, which are treated as having an average width of 100 feet.
4 Category 1 includes clear-cut, rehab, seed tree step, and shelterwood seed step prescriptions; Category 2 includes shelter wood prep step, shelterwood removal step, and alternative prescriptions; Category 3 includes selection, commercial thin, sanitation salvage, transition, and seed tree removal step prescriptions.
5 Landslide features and selected geomorphic features include earth flow, rock slide, debris slide, debris flow, debris slide slopes, disrupted ground, eroding banks and inner gorges.

Table 15: Land Use or Type Associated with Landslides in the Northern Subbasin.

Northern Subbasin Planning Watersheds	Historically Active Landslide Feature[1]	Entire Subbasin or Planning Watershed	Woodland and Grassland[2]	THPs 1990 - 2000[5]	Timberland, No Recent Harvest[3]	Roads[4]	
		% of Area	% of Area	% of Area	% of Area	Length (miles)	% of Total Length
Apple Tree	Earthflow	4.4%	3.1%		1.3%	1.1	4.8%
	Rock Slide	0.4%	0.4%		0.1%	0.3	1.3%
	Debris Slide	1.7%	0.4%		1.4%	0.2	0.9%
	Debris Flow	0.3%	0.2%		0.1%		
	All Features	**6.9%**	**4.0%**	**0.0%**	**2.8%**	**1.6**	**7.0%**
Camp Mattole	Earthflow	1.5%	1.3%		0.2%	0.7	1.8%
	Rock Slide	0.3%	0.2%		0.0%		
	Debris Slide	1.8%	0.5%	0.2%	0.9%	0.5	1.3%
	Debris Flow	0.1%	0.1%		0.0%	0.0	0.0%
	All Features	**3.7%**	**2.1%**	**0.2%**	**1.1%**	**1.2**	**3.1%**
Cow Pasture Opening (6,610 acres) (44.1 road miles)	Earthflow	0.5%	0.5%		0.0%	0.1	0.2%
	Rock Slide	0.5%	0.2%	0.0%	0.3%	0.1	0.2%
	Debris Slide	0.6%	0.3%		0.3%	0.1	0.2%
	Debris Flow	0.5%	0.2%	0.0%	0.2%	0.3	0.7%
	All Features	**2.1%**	**1.2%**	**0.0%**	**0.7%**	**0.6**	**1.4%**
Joel Flat (4,985 acres) (24.9 road miles)	Earthflow	5.5%	4.4%		0.2%	0.4	1.6%
	Rock Slide	1.1%	0.5%		0.6%	0.4	1.6%
	Debris Slide	1.3%	0.8%		0.4%	0.2	0.8%
	Debris Flow						
	All Features	**8.0%**	**5.8%**	**0.0%**	**1.2%**	**1.0**	**4.0%**
Long Ridge (6,659 acres) (33.0 road miles)	Earthflow	7.5%	3.6%	1.2%	2.4%	2.3	7.0%
	Rock Slide	2.3%	1.7%	0.0%	0.6%	0.9	2.7%
	Debris Slide	2.5%	0.2%	0.0%	2.2%	0.5	1.5%
	Debris Flow	0.1%	0.0%		0.1%		
	All Features	**12.4%**	**5.5%**	**1.2%**	**5.3%**	**3.7**	**11.2%**

Northern Subbasin Planning Watersheds	Historically Active Landslide Feature[1]	Entire Subbasin or Planning Watershed		Woodland and Grassland[2]		THPs 1990 - 2000[5]		Timberland, No Recent Harvest[3]		Roads[4]	
			% of Area		% of Area		% of Area		% of Area	Length (miles)	% of Total Length
McGinnis Creek (4,688 acres) (26.1 road miles)	Earthflow		3.8%		2.8%				1.0%	1.4	5.4%
	Rock Slide		1.5%		0.9%				0.3%	0.3	1.1%
	Debris Slide		1.7%		0.1%		0.1%		1.5%	0.3	1.1%
	Debris Flow		0.2%		0.0%		0.0%		0.1%		
	All Features		**7.3%**		**3.8%**		**0.1%**		**2.9%**	**2.0**	**7.7%**
Oil Creek (8,829 acres) (47.3 road miles)	Earthflow		7.9%		4.5%		0.2%		2.6%	5.4	11.4%
	Rock Slide		0.3%		0.2%		0.0%		0.1%	0.0	0.0%
	Debris Slide		2.4%		0.3%		0.4%		1.6%	0.4	0.8%
	Debris Flow		0.1%		0.0%				0.0%	0.0	0.0%
	All Features		**10.7%**		**5.0%**		**0.7%**		**4.8%**	**5.8**	**12.3%**
Petrolia (5,044 acres) (25.7 road miles)	Earthflow		2.4%		2.0%				0.1%	0.3	1.2%
	Rock Slide		1.7%		1.2%				0.1%	0.9	3.5%
	Debris Slide		0.0%						0.0%		
	Debris Flow										
	All Features		**4.1%**		**3.3%**		**0.0%**		**0.3%**	**1.2**	**4.7%**
Rainbow (7,192 acres) (30.8 road miles)	Earthflow		3.3%		1.7%		0.0%		1.6%	0.4	1.3%
	Rock Slide		0.5%		0.1%		0.1%		0.3%	0.5	1.6%
	Debris Slide		2.5%		0.2%				2.4%	0.2	0.6%
	Debris Flow		0.2%		0.0%				0.2%	0.0	0.0%
	All Features		**6.5%**		**2.0%**		**0.1%**		**4.4%**	**1.1**	**3.6%**
Rattlesnake Creek (8,666 acres) (48.6 road miles)	Earthflow		4.8%		2.6%		0.0%		2.2%	2.8	5.8%
	Rock Slide		1.4%		1.2%				0.2%	0.8	1.6%
	Debris Slide		6.8%		0.6%		0.0%		5.9%	2.2	4.5%
	Debris Flow										
	All Features		**13.0%**		**4.4%**		**0.0%**		**8.3%**	**5.8**	**11.9%**

1 Refer to Plate 1 and California Geological Survey appendix. This category includes only large polygon slides and does not include point slides.
2 Woodland and grassland include areas mapped in 1998 as grassland and non-productive hardwood.
3 Area of timberlands that were not contained in a THP during the 1991 to 2000 period.
4 Roads layer is from the Information Center for the Environment (ICE) at UC Davis.

5 THP's are complete or active between the 1990 and 2000 timeframe.
Empty cells denote zero.
Percent of area is based on the unit of analysis: Watershed, subbasin, or planning watershed.

Table 16: Land Use and Relative Landslide Potential in the Northern Subbasin.

Northern Subbasin Planning Watersheds	**Relative Landslide Potential**[1]	**Entire Planning Watershed**		**Woodland or Grassland**[2]		**THPs 1990 - 2000**[5]		**Timberland, No Recent Harvest**[3]		**Roads**[4]	
			% of Area		% of Area		% of Area		% of Area	Length (miles)	% of Total Length
Apple Tree (3,921 acres) (23.0 road miles)	Very Low		1.8%		0.6%		0.0%		0.9%	1.0	4.3%
	Low		2.6%		0.8%		0.1%		1.6%	1.1	4.8%
	Moderate		26.5%		6.6%		0.1%		19.8%	6.2	27.0%
	High		35.0%		14.7%		0.0%		20.2%	7.9	34.3%
	Very High		34.1%		12.1%		0.0%		22.0%	6.8	29.6%
	High/Very High Subtotal		69.1%		26.8%		0.0%		42.2%	14.7	63.9%
	TOTAL		**100%**		**35%**		**0%**		**65%**	**23.0**	**100%**
Camp Mattole (6,952 acres) (38.5road miles)	Very Low		11.4%		6.4%		0.2%		1.3%	8.4	21.8%
	Low		8.5%		5.4%		0.2%		2.3%	4.7	12.2%
	Moderate		27.5%		14.0%		0.8%		12.4%	9.2	23.9%
	High		22.9%		13.3%		0.5%		8.9%	8.6	22.3%
	Very High		29.7%		10.5%		1.2%		17.6%	7.6	19.7%
	High/Very High Subtotal		52.6%		23.8%		1.7%		26.5%	16.2	42.1%
	TOTAL		**100%**		**50%**		**3%**		**42%**	**38.5**	**100%**
Cow Pasture Opening (6,610 acres) (44.1 road miles)	Very Low		11.7%		7.2%		0.0%		1.6%	9.0	20.4%
	Low		5.9%		3.2%		0.2%		2.4%	2.4	5.4%
	Moderate		25.0%		10.2%		0.8%		14.3%	10.4	23.6%
	High		27.9%		16.2%		1.1%		11.1%	11.2	25.4%
	Very High		29.5%		14.4%		0.7%		14.3%	11.0	24.9%

Northern Subbasin Planning Watersheds	Relative Landslide Potential[1]	Entire Planning Watershed		Woodland or Grassland[2]		THPs 1990 - 2000[5]		Timberland, No Recent Harvest[3]		Roads[4]	
			% of Area		% of Area		% of Area		% of Area	Length (miles)	% of Total Length
	High/Very High Subtotal		57.4%		30.6%		1.7%		25.3%	22.2	50.3%
	TOTAL		**100%**		**51%**		**3%**		**44%**	**44.0**	**100%**
Joel Flat (4,985 acres) (24.9 road miles)	Very Low		1.9%		1.2%		0.0%		0.2%	0.9	3.6%
	Low		6.5%		4.5%		0.0%		1.7%	2.9	11.6%
	Moderate		23.8%		14.2%		0.1%		9.2%	7.1	28.5%
	High		33.0%		22.3%		0.2%		9.4%	7.5	30.1%
	Very High		34.6%		19.2%		0.2%		13.5%	6.4	25.7%
	High/Very High Subtotal		67.6%		41.6%		0.4%		23.0%	13.9	55.8%
	TOTAL		**100%**		**61%**		**1%**		**34%**	**24.8**	**100%**
Long Ridge (6,659 acres) (33.0 road miles)	Very Low		0.5%		0.4%		0.0%		0.1%	0.8	2.4%
	Low		4.0%		1.4%		0.2%		2.5%	1.9	5.8%
	Moderate		23.6%		4.5%		2.1%		16.8%	6.8	20.6%
	High		39.0%		11.3%		7.5%		19.4%	13.3	40.3%
	Very High		32.6%		10.1%		2.7%		19.2%	10.2	30.9%
	High/Very High Subtotal		71.5%		21.4%		10.2%		38.6%	23.5	71.2%
	TOTAL		**100%**		**28%**		**13%**		**58%**	**33.0**	**100%**
McGinnis Creek (4,688 acres) (26.1 road miles)	Very Low		3.9%		1.8%		0.0%		0.7%	0.6	2.3%
	Low		7.4%		2.0%		0.6%		4.4%	2.1	8.0%
	Moderate		33.1%		7.0%		1.4%		24.7%	9.0	34.5%
	High		20.0%		4.2%		1.1%		14.5%	5.4	20.7%
	Very High		35.7%		8.2%		2.7%		23.9%	9.0	34.5%
	High/Very High Subtotal		55.6%		12.4%		3.8%		38.4%	14.4	55.2%

Northern Subbasin Planning Watersheds	Relative Landslide Potential[1]	Entire Planning Watershed		Woodland or Grassland[2]		THPs 1990 - 2000[5]		Timberland, No Recent Harvest[3]		Roads[4]	
			% of Area		% of Area		% of Area		% of Area	Length (miles)	% of Total Length
	TOTAL		**100%**		**23%**		**6%**		**68%**	**26.1**	**100%**
Oil Creek (8,829 acres) (47.3 road miles)	Very Low		1.6%		0.6%		0.3%		0.2%	1.2	2.5%
	Low		5.6%		2.5%		1.2%		1.9%	4.6	9.7%
	Moderate		19.0%		6.1%		1.4%		11.3%	9.7	20.5%
	High		33.8%		13.5%		2.5%		16.7%	15.9	33.6%
	Very High		40.0%		10.7%		3.9%		24.6%	15.8	33.4%
	High/Very High Subtotal		73.8%		24.2%		6.4%		41.4%	31.7	67.0%
	TOTAL		**100%**		**33%**		**9%**		**55%**	**47.2**	**100%**
Petrolia (5,044 acres) (25.7 road miles)	Very Low		27.2%		13.6%		0.0%		1.8%	8.0	31.1%
	Low		8.1%		5.8%		0.0%		1.4%	2.1	8.2%
	Moderate		27.1%		16.9%		0.3%		8.1%	6.1	23.7%
	High		26.0%		14.4%		0.0%		8.4%	6.5	25.3%
	Very High		11.7%		6.7%		0.0%		3.4%	3.1	12.1%
	High/Very High Subtotal		37.7%		21.1%		0.0%		11.8%	9.6	37.4%
	TOTAL		**100%**		**57%**		**0%**		**23%**	**25.8**	**100%**
Rainbow (7,129 acres) (30.8 road miles)	Very Low		0.4%		0.2%		0.0%		0.2%	0.2	0.6%
	Low		7.5%		0.9%		0.2%		6.5%	3.2	10.4%
	Moderate		38.9%		3.8%		1.5%		33.0%	12.8	41.6%
	High		27.5%		7.3%		1.2%		18.7%	9.6	31.2%
	Very High		26.5%		6.0%		0.5%		19.8%	5.0	16.2%
	High/Very High Subtotal		54.0%		13.3%		1.7%		38.5%	14.6	47.4%
	TOTAL		**101%**		**2%**		**3%**		**78%**	**30.8**	**100%**
Rattlesnake Creek	Very Low		3.0%		1.9%		0.1%		0.2%	3.9	8.0%

Northern Subbasin Planning Watersheds	Relative Landslide Potential[1]	Entire Planning Watershed		Woodland or Grassland[2]		THPs 1990 - 2000[5]		Timberland, No Recent Harvest[3]		Roads[4]	
			% of Area		% of Area		% of Area		% of Area	Length (miles)	% of Total Length
(8,666 acres) (48.6 road miles)	Low		5.8%		1.6%		1.1%		3.0%	4.5	9.3%
	Moderate		28.1%		4.0%		2.4%		21.6%	14.6	30.0%
	High		26.6%		8.1%		0.7%		17.8%	12.8	26.3%
	Very High		36.3%		7.3%		0.6%		28.1%	12.6	25.9%
	High/Very High Subtotal		63.0%		15.4%		1.4%		45.9%	25.4	52.3%
	TOTAL		**100%**		**23%**		**5%**		**71%**	**48.4**	**100%**

1 Refer to Plate 2 and California Geological Survey appendix.
2 Woodland and grassland include areas mapped in 1998 as grassland and non-productive hardwood.
3 Area of timberlands that were not contained in a THP during the 1991 to 2000 period.
4 Roads layer is from the Information Center for the Environment (ICE) at UC Davis.
5 THP's are complete or active between the 1990 and 2000 timeframe.
Empty cells denote zero.
Percent of area is based on the unit of analysis: Watershed, subbasin, or planning watershed.

Table 17: Timber Harvest and Relative Landslide Potential in the Northern Subbasin

Northern Subbasin Planning Watersheds	Relative Landslide Potential	Silvicultural System and Yarding Methods for THPs 1990 - 2000												Total THPs 1990-2000
		Category 1 Silviculture				Category 2 Silviculture				Category 3 Silviculture				
		Tractor (% of	Cable (% of	Copter (% of	Total (% of	Tractor (% of	Cable (% of	Copter (% of	Total (% of	Tractor (% of	Cable (% of	Copter (% of	Total (% of	TOTAL (% of
Apple Tree	Very Low													
	Low					0.1%								
	Moderate					0.1%								
	High													
	Very High													
	High/Very High Subtotal													
	Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.2%**	**0.0%**	**0.0%**	**0.2%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.2%**
Camp Mattole	Very Low									0.2%			0.2%	0.2%
	Low	0.0%		0.0%	0.0%					0.2%			0.2%	0.2%
	Moderate	0.2%	0.3%	0.1%	0.6%					0.0%	0.1%		0.2%	0.8%
	High	0.0%	0.2%	0.1%	0.4%					0.1%	0.0%		0.1%	0.5%

	Very High	0.1%	0.6%	0.4%	1.1%					0.1%	0.1%		0.2%	1.2%
	High/Very High Subtotal	0.1%	0.8%	0.5%	1.4%					0.2%	0.1%		0.3%	1.7%
	Total	**0.3%**	**1.2%**	**0.6%**	**2.1%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.6%**	**0.3%**	**0.0%**	**0.8%**	**2.9%**
Cow Pasture Opening	Very Low								0.0%					
	Low					0.2%			0.2%					
	Moderate					0.8%			0.8%					
	High					1.1%			1.1%					
	Very High					0.7%			0.7%					
	High/Very High Subtotal					1.7%			1.7%					
	Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**2.6%**	**0.0%**	**0.0%**	**2.6%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**2.6%**
Joel Flat	Very Low													
	Low													
	Moderate	0.1%			0.1%					0.1%			0.1%	0.1%
	High	0.1%			0.1%					0.0%			0.0%	0.2%
	Very High	0.2%			0.2%									
	High/Very High Subtotal	0.4%			0.4%					0.0%			0.0%	0.4%

	Total	**0.4%**	**0.0%**	**0.0%**	**0.4%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.1%**	**0.0%**	**0.0%**	**0.1%**	**0.5%**
Long Ridge	Very Low		0.0%		0.0%	0.0%			0.0%					
	Low	0.0%	0.0%		0.1%	0.1%	0.0%		0.1%	0.0%			0.0%	0.3%
	Moderate	0.6%	0.2%	0.0%	0.8%	0.6%	0.1%	0.0%	0.8%	0.3%		0.2%	0.5%	2.1%
	High	1.2%	0.2%	0.0%	1.5%	2.9%	1.2%	0.0%	4.1%	1.4%		0.5%	2.0%	7.5%
	Very High	0.2%	0.4%		0.6%	1.0%	0.7%		1.7%	0.1%		0.3%	0.4%	2.7%
	High/Very High Subtotal	1.4%	0.6%	0.0%	2.1%	3.9%	1.9%	0.0%	5.8%	1.5%		0.8%	2.3%	10.2%
	Total	**2.0%**	**0.9%**	**0.0%**	**2.9%**	**4.6%**	**2.0%**	**0.1%**	**6.7%**	**1.9%**	**0.0%**	**1.0%**	**2.9%**	**12.5%**
McGinnis Creek	Very Low		0.0%		0.0%									
	Low	0.3%	0.1%		0.4%					0.3%			0.3%	0.6%
	Moderate	0.5%	0.6%		1.1%					0.2%			0.2%	1.4%
	High	0.2%	0.8%		1.1%					0.0%	0.0%		0.1%	1.1%
	Very High	0.4%	2.1%	0.0%	2.6%					0.0%	0.1%		0.1%	2.6%
	High/Very High Subtotal	0.6%	3.0%	0.0%	3.6%					0.1%	0.1%		0.1%	3.8%
	Total	**1.5%**	**3.7%**	**0.0%**	**5.2%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.6%**	**0.1%**	**0.0%**	**0.6%**	**5.8%**
Oil Creek	Very Low	0.1%			0.1%					0.2%			0.2%	0.3%
	Low	0.3%	0.1%	0.1%	0.5%					0.6%			0.6%	1.2%

	Moderate	0.1%	0.1%	0.5%	0.6%					0.6%	0.2%		0.8%	1.4%
	High	0.1%	0.0%	0.4%	0.5%					1.0%	0.9%		1.9%	2.5%
	Very High	0.1%	0.0%	0.1%	0.2%					0.6%	3.0%		3.7%	3.9%
	High/Very High Subtotal	0.1%	0.0%	0.5%	0.8%					1.6%	4.0%		5.6%	6.4%
	Total	**0.7%**	**0.2%**	**1.1%**	**2.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**3.0%**	**4.2%**	**0.0%**	**7.2%**	**9.2%**
Petrolia	Very Low													
	Low					0.0%			0.0%					
	Moderate					0.3%			0.3%					
	High					0.0%			0.0%					
	Very High								0.0%					
	High/Very High Subtotal					0.0%			0.0%					
	Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.4%**	**0.0%**	**0.0%**	**0.4%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.4%**
Rainbow	Very Low					0.0%			0.0%					
	Low	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.1%	0.0%		0.1%	0.2%
	Moderate	0.2%	0.5%	0.4%	1.0%	0.0%	0.2%	0.0%	0.2%	0.1%	0.1%	0.0%	0.2%	1.5%
	High	0.1%	0.3%	0.2%	0.6%					0.4%	0.3%	0.0%	0.6%	1.2%
	Very High	0.0%	0.1%	0.1%	0.2%					0.2%	0.1%		0.3%	0.5%
	High/Very	0.1%	0.4%	0.3%	0.8%					0.6%	0.3%	0.0%	0.9%	1.7%

	High Subtotal													
	Total	**0.3%**	**0.9%**	**0.6%**	**1.9%**	**0.1%**	**0.2%**	**0.0%**	**0.3%**	**0.8%**	**0.4%**	**0.1%**	**1.3%**	**3.4%**
Rattlesnake Creek	Very Low	0.0%	0.0%		0.0%	0.0%			0.0%	0.0%			0.0%	0.1%
	Low	0.1%	0.1%	0.0%	0.3%	0.5%			0.5%	0.2%	0.0%	0.0%	0.3%	1.1%
	Moderate	0.4%	0.2%	0.3%	0.8%	0.5%	0.1%		0.6%	0.5%	0.1%	0.4%	1.0%	2.4%
	High	0.0%	0.1%	0.1%	0.2%	0.1%			0.1%	0.1%		0.4%	0.4%	0.7%
	Very High	0.0%	0.0%	0.0%	0.1%	0.1%			0.1%	0.1%	0.0%	0.4%	0.5%	0.6%
	High/Very High Subtotal	0.1%	0.1%	0.1%	0.3%	0.1%			0.1%	0.2%	0.0%	0.7%	0.9%	1.3%
	Total	**0.6%**	**0.3%**	**0.4%**	**1.4%**	**1.2%**	**0.1%**	**0.0%**	**1.3%**	**0.9%**	**0.2%**	**1.2%**	**2.2%**	**4.9%**

1Refer to Plate 2 and California Geological Survey appendix for relative landslide potential map and description.
2Category 1 silviculture includes clear cut, rehab, seed tree step, and shelter wood seed step prescriptions; Category 2 silviculture includes shelter wood prep step, shelter wood removal step, and alternative prescriptions; Category 3 silviculture includes selection, commercial thin, sanitation salvage, transition, and seed tree removal step prescriptions.
3THP's are complete or active between the 1990 and 2000 timeframe

Table 18: Data Summary Table for the Western Subbasin.

Factor	**Western Subbasin Planning Watersheds**													
	Big Finley Creek		**Honeydew Creek**		**N. Fork Bear Creek**		**Shenanigan Ridge**		**S. Fork Bear Creek**		**Squaw Creek**		**Woods Creek**	
Relative Landslide Potential[1]		% area		% area		% area		% area		% area		% area		% area
Very Low		0.2%		1.0%		0.9%		5.4%		1.0%		0.9%		5.9%
Low		4.0%		3.5%		5.6%		3.8%		4.4%		3.3%		6.4%
Moderate		14.0%		11.9%		12.9%		18.1%		17.9%		15.2%		12.3%
High		8.6%		10.9%		9.7%		8.1%		7.8%		10.2%		11.5%
Very High		14.0%		13.1%		13.0%		10.1%		11.8%		11.7%		9.5%
High/Very High Subtotal		*23%*		*24%*		*23%*		*18%*		*20%*		*22%*		*21%*
GRAND TOTAL		**41%**		**40%**		**42%**		**45%**		**43%**		**41%**		**46%**

Factor	Western Subbasin Planning Watersheds													
	Big Finley Creek		Honeydew Creek		N. Fork Bear Creek		Shenanigan Ridge		S. Fork Bear Creek		Squaw Creek		Woods Creek	
Landslide and Selected Geomorphic Features		% area		% area		% area		% area		% area		% area		% area
Historically Active Landslide Features Total		**0.3%**		**1.9%**		**1.1%**		**0.5%**		**0.1%**		**0.7%**		**0.9%**
Earthflow		0.1%		0.6%		0.1%		0.2%		0.0%		0.3%		0.5%
Rock Slide		0.0%		0.3%		0.0%		0.0%		0.0%		0.1%		0.1%
Debris Slide		0.2%		1.0%		1.0%		0.3%		0.1%		0.4%		0.2%
Debris Flow		0.0%		0.0%		0.0%		0.0%		0.0%		0.0%		0.0%
Dormant Landslide Features Total		**3.2%**		**8.8%**		**4.6%**		**9.8%**		**0.9%**		**8.3%**		**5.9%**
Selected Geomorphic Features Total		**23.7%**		**16.8%**		**20.6%**		**9.1%**		**24.1%**		**18.0%**		**13.9%**
Disrupted Ground		0.0%		0.6%		0.4%		0.1%		0.0%		1.1%		1.9%
Debris Slide Slope		22.2%		15.5%		19.1%		8.4%		23.3%		15.9%		11.4%
Inner Gorge (area)[2]		1.5%		0.7%		1.0%		0.7%		0.8%		1.0%		0.6%
Total of All Above Features		**27.2%**		**27.4%**		**26.3%**		**19.5%**		**25.1%**		**27.0%**		**20.7%**
Timber Harvest 1990 -2000[3]	acres	% area	acres	% area	acres	% area	acres	% area	acres	% area	acres	% area	acres	% area
Silviculture Category 1														
Tractor														
Cable														
Helicopter											24	0.1%		
TOTAL	**0**	**0.0%**	**0**	**0.0%**	**0**	**0.0%**	**0**	**0.0%**	**0**	**0.0%**	**24**	**0.1%**	**0**	**0.0%**
Silviculture Category 2														
Tractor					6	0.0%								
Cable														
Helicopter											24	0.1%		
TOTAL	**0**	**0.0%**	**0**	**0.0%**	**6**	**0.0%**	**0**	**0.0%**	**0**	**0.0%**	**24**	**0.1%**	**0**	**0.0%**
Silviculture Category 3														
Tractor			6	0.0%	2	0.0%	34						12	0.1%
Cable														
Helicopter											61	0.2%		

Factor	Western Subbasin Planning Watersheds													
	Big Finley Creek		Honeydew Creek		N. Fork Bear Creek		Shenanigan Ridge		S. Fork Bear Creek		Squaw Creek		Woods Creek	
TOTAL	**0**	**0.0%**	**6**	**0.0%**	**2**	**0.0%**	**34**	**0.2%**	**0**	**0.0%**	**61**	**0.2%**	**12**	**0.1%**
TOTAL	**0**	**0.0%**	**6**	**0.0%**	**9**	**0.0%**	**34**	**0.2%**	**0**	**0.0%**	**110**	**0.4%**	**12**	**0.1%**
Other Land Uses	acres	% area	acres	% area	acres	% area	acres	% area	acres	% area	acres	% area	acres	% area
Grazing	148.1	1.0%	858.8	2.9%	297.0	1.5%	588.6	2.7%	2.8	0.0%	1,264.3	4.8%	863.3	7.7%
Agriculture	10.1	0.1%	33.9	0.1%	85.3	0.4%	256.6	1.2%	0.0	0.0%	89.7	0.3%	135.0	1.2%
Development	0.0	0.0%	0.0	0.0%	0.0	0.0%	3.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Timberland, No Recent Harvest	5,567	38.4%	10,196	33.9%	7,801	39.1%	7,709	35.4%	5,414	42.0%	8,516	32.4%	3,395	30.3%
TOTAL	**5,725**	**39.4%**	**11,089**	**36.9%**	**8,183**	**41.0%**	**8,557**	**39.3%**	**5,417**	**42.0%**	**9,870**	**37.6%**	**4,393**	**39.2%**
Roads														
Road Density (miles/sq. mile)	3.4		5.7		4.2		5.0		3.8		3.1		5.6	
Density of Road Crossings (#/stream mile)	0.3		1.1		0.4		0.7		0.7		0.2		0.4	
Roads within 200' of Stream (miles/stream mile)	0.1		0.2		0.1		0.2		0.2		0.1		0.1	
Streams	% stream length		% stream length		% stream length		% stream length		% stream length		% stream length		% stream length	
% Stream by Gradient														
< 1% (Response Reach)		19.0%		8.0%		18.0%		29.0%		11.0%		12.0%		34.0%
1-4% (Response Reach)		13.0%		17.0%		21.0%		8.0%		39.0%		18.0%		12.0%
4-20% (Transport Reach)		46.0%		42.0%		39.0%		39.0%		29.0%		40.0%		36.0%
>20% (Source Reach)		23.0%		33.0%		22.0%		24.0%		21.0%		30.0%		18.0%
Historically Active and Dormant Landslide and Selected Geomorphic Features[4]	% area	% stream length	% area	% stream length	% area	% stream length	% area	% stream length	% area	% stream length	% area	% stream length	% area	% stream length
Within 180' of Blue Line Stream	23.9%	78.9%	26.4%	36.1%	20.8%	52.6%	20.2%	31.2%	22.5%	37.7%	24.1%	55.3%	19.4%	29.8%

1 Refer to California Geological Survey appendix for landslide map (Plate 1), relative landslide potential map (Plate 2) and description.
2 Area based on inner gorges captured as polygons plus inner gorges captured as linear features, which are treated as having an average width of 100 feet.
3 Category 1 includes clear-cut, rehab, seed tree step, and shelter wood seed step prescriptions; Category 2 includes shelter wood prep step, shelter wood removal step, and alternative prescriptions; Category 3 includes selection, commercial thin, sanitation salvage, transition, and seed tree removal step prescriptions.
4 Landslide features and selected geomorphic features include earth flow, rock slide, debris slide, debris flow, debris slide slopes, disrupted ground, eroding banks and inner gorges.

Table 19: Land Use or Type Associated with Landslides in the Western Subbasin.

Western Subbasin Planning Watersheds	Historically Active Landslide Feature[1]	Entire Subbasin or Planning Watershed	Woodland and Grassland[2]	THPs 1990 - 2000[5]	Timberland, No Recent Harvest[3]	Roads[4]	
		% of Area	% of Area	% of Area	% of Area	Length (miles)	% of Total Length
Big Finely Creek	Earthflow	0.3%	0.2%		0.1%	0.1	0.3%
	Rock Slide	0.0%			0.0%		
	Debris Slide	0.5%	0.0%		0.5%	0.3	0.9%
	Debris Flow						
	All Features	**0.8%**	**0.3%**	**0.0%**	**0.6%**	**0.4**	**0.4%**
Honeydew Creek	Earthflow	1.4%	0.9%		0.3%	0.9	0.8%
	Rock Slide	0.8%	0.1%		0.7%	0.8	0.7%
	Debris Slide	2.4%	0.3%		1.9%	1.9	1.8%
	Debris Flow						
	All Features	**4.6%**	**1.2%**	**0.0%**	**2.9%**	**3.6**	**3.3%**
N. Fork Bear Creek	Earthflow	0.2%	0.0%		0.1%	0.1	0.2%
(8,367 acres)	Rock Slide	0.0%			0.0%		
(57.3 road miles)	Debris Slide	2.5%	0.0%		1.6%	1.7	3.0%
	Debris Flow						
	All Features	**2.7%**	**0.1%**	**0.0%**	**1.7%**	**1.8**	**3.1%**
Shenanigan Ridge	Earthflow	0.5%	0.4%		0.1%	0.3	0.4%
(9,909 acres)	Rock Slide	0.1%			0.1%	0.1	0.1%
(76.3 road miles)	Debris Slide	0.6%	0.0%		0.4%	0.3	0.4%
	Debris Flow	0.0%			0.0%		
	All Features	**1.2%**	**0.4%**	**0.0%**	**0.5%**	**0.7**	**0.9%**
S. Fork Bear Creek	Earthflow				0.0%		
(5,526 acres)	Rock Slide				0.0%		
(29.5 road miles)	Debris Slide	0.3%			0.3%		
	Debris Flow						
	All Features	**0.3%**	**0.0%**	**0.0%**	**0.3%**	**0.0**	**0.0%**
Squaw Creek	Earthflow	0.7%	0.5%		0.2%	0.5	1.0%
(10,806 acres)	Rock Slide	0.2%		0.1%	0.1%		
(50.0 road miles)	Debris Slide	0.9%	0.3%		0.6%	0.1	0.2%

Western Subbasin Planning Watersheds	Historically Active Landslide Feature[1]	Entire Subbasin or Planning Watershed		Woodland and Grassland[2]		THPs 1990 - 2000[5]		Timberland, No Recent Harvest[3]		Roads[4]	
			% of Area		% of Area		% of Area		% of Area	Length (miles)	% of Total Length
	Debris Flow		0.0%								
	All Features		**1.8%**		**0.8%**		**0.1%**		**1.0%**	**0.6**	**1.2%**
Woods Creek (5,114 acres) (39.1 road miles)	Earthflow		1.2%		0.3%				0.8%	0.7	1.8%
	Rock Slide		0.2%		0.1%				0.1%	0.2	0.5%
	Debris Slide		0.5%		0.2%				0.3%	0.1	0.3%
	Debris Flow										
	All Features		**1.9%**		**0.7%**		**0.0%**		**1.2%**	**1.0**	**2.6%**

1 Refer to Plate 1 and California Geological Survey appendix.
2 Woodland and grassland includes areas mapped in 1998 as grassland and non-productive hardwood.
3 Area of timberlands that were not contained in a THP during the 1991 to 2000 period.
4 Roads layer is from the Information Center for the Environment (ICE) at UC Davis.
5 THP's are complete or active between the 1990 and 2000 timeframe.
Empty cells denote zero.
Percent of area is based on the unit of analysis: Watershed, subbasin, or planning watershed.

Table 20: Land Use and Relative Landslide Potential in the Western Subbasin.

Western Subbasin Planning Watersheds	Relative Landslide Potential[1]	Entire Subbasin or Planning Watershed		Woodland or Grassland[2]		THPs 1990 - 2000[5]		Timberland, No Recent Harvest[3]		Roads[4]	
			% of Area		% of Area		% of Area		% of Area	Length (miles)	% of Total Length
Big Finely Creek (5,924 acres) (34.3 road miles)	Very Low		0.6%		0.1%		0.0%		0.4%	0.4	1.2%
	Low		9.9%		0.8%		0.0%		9.0%	3.4	9.9%
	Moderate		34.2%		2.3%		0.0%		31.8%	13.4	39.1%
	High		21.0%		1.5%		0.0%		19.4%	8.8	25.7%
	Very High		34.4%		1.0%		0.0%		33.4%	8.3	24.2%

Western Subbasin Planning Watersheds	Relative Landslide Potential[1]	Entire Subbasin or Planning Watershed		Woodland or Grassland[2]		THPs 1990 - 2000[5]		Timberland, No Recent Harvest[3]		Roads[4]	
			% of Area		% of Area		% of Area		% of Area	Length (miles)	% of Total Length
	High/Very High Subtotal		55.4%		2.6%		0.0%		52.8%	17.1	49.9%
	TOTAL		**100%**		**6%**		**0%**		**94%**	**34.3**	**100%**
Honeydew Creek (12,113 acres) (107.6 road miles)	Very Low		2.4%		1.1%		0.0%		0.6%	3.9	3.6%
	Low		8.8%		1.7%		0.0%		6.9%	12.0	11.2%
	Moderate		29.5%		2.7%		0.0%		26.4%	36.0	33.5%
	High		27.0%		3.8%		0.0%		22.5%	31.3	29.1%
	Very High		32.4%		4.0%		0.0%		27.8%	24.4	22.7%
	High/Very High Subtotal		59.4%		7.8%		0.0%		50.3%	55.7	51.8%
	TOTAL		**100%**		**13%**		**0%**		**84%**	**107.6**	**100%**
N. Fork Bear Creek (8,367acres) (57.3 road miles)	Very Low		2.1%		0.5%		0.0%		1.0%	1.7	3.0%
	Low		13.3%		1.3%		0.0%		11.6%	9.2	16.1%
	Moderate		30.7%		1.7%		0.0%		28.8%	20.0	34.9%
	High		23.0%		1.1%		0.0%		21.9%	13.1	22.9%
	Very High		30.9%		0.8%		0.0%		30.0%	13.2	23.0%
	High/Very High Subtotal		53.9%		1.9%		0.0%		51.9%	26.3	45.9%
	TOTAL		**100%**		**5%**		**0%**		**93%**	**57.2**	**100%**
Shenanigan Ridge (9,909 acres) (76.3 road miles)	Very Low		11.8%		2.8%		0.0%		2.5%	7.5	9.8%
	Low		8.4%		1.8%		0.0%		6.2%	7.7	10.1%
	Moderate		39.7%		4.2%		0.2%		34.5%	31.6	41.4%
	High		17.9%		2.3%		0.1%		15.0%	15.4	20.2%
	Very High		22.2%		2.1%		0.0%		19.6%	14.1	18.5%
	High/Very High Subtotal		40.1%		4.5%		0.1%		34.6%	29.5	38.7%
	TOTAL		**100%**		**13%**		**0%**		**78%**	**76.3**	**100%**

Western Subbasin Planning Watersheds	Relative Landslide Potential[1]	Entire Subbasin or Planning Watershed		Woodland or Grassland[2]		THPs 1990 - 2000[5]		Timberland, No Recent Harvest[3]		Roads[4]	
			% of Area		% of Area		% of Area		% of Area	Length (miles)	% of Total Length
S. Fork Bear Creek (5,526 acres) (29.5 road miles)	Very Low		2.3%		0.2%		0.0%		2.1%	1.4	4.7%
	Low		10.2%		0.2%		0.0%		10.0%	4.7	15.9%
	Moderate		41.8%		0.4%		0.0%		41.3%	12.3	41.7%
	High		18.2%		0.2%		0.0%		18.0%	4.8	16.3%
	Very High		27.5%		0.5%		0.0%		26.7%	6.3	21.4%
	High/Very High Subtotal		45.7%		0.7%		0.0%		44.6%	11.1	37.6%
	TOTAL		**100%**		**2%**		**0%**		**98%**	**29.5**	**100%**
Squaw Creek (10,806 acres) (50.0 road miles)	Very Low		2.1%		0.3%		0.0%		1.1%	2.0	4.0%
	Low		7.9%		1.6%		0.1%		6.1%	6.0	12.0%
	Moderate		36.9%		6.8%		0.4%		29.6%	20.8	41.6%
	High		24.7%		6.2%		0.4%		18.1%	10.8	21.6%
	Very High		28.4%		4.3%		0.1%		24.0%	10.3	20.6%
	High/Very High Subtotal		53.1%		10.5%		0.5%		42.1%	21.1	42.2%
	TOTAL		**100%**		**19%**		**1%**		**79%**	**49.9**	**100%**
Woods Creek (5,114 acres) (39.1 road miles)	Very Low		13.0%		5.6%		0.2%		2.4%	6.8	17.4%
	Low		14.0%		2.6%		0.0%		9.9%	5.7	14.6%
	Moderate		27.0%		5.9%		0.0%		20.3%	10.7	27.4%
	High		25.3%		8.5%		0.0%		16.1%	10.6	27.1%
	Very High		20.8%		2.9%		0.0%		17.7%	5.3	13.6%
	High/Very High Subtotal		46.1%		11.4%		0.0%		33.8%	15.9	40.7%
	TOTAL		**100%**		**25%**		**0%**		**66%**	**39.1**	**100%**

1 Refer to Plate 2 and California Geological Survey appendix.
2 Woodland and grassland includes areas mapped in 1998 as grassland and non-productive hardwood.
3 Area of timberlands that were not contained in a THP during the 1991 to 2000 period.
4 Roads layer is from the Information Center for the Environment (ICE) at UC Davis.
5 THP's are complete or active between the 1990 and 2000 timeframe.

Empty cells denote zero.
Percent of area is based on the unit of analysis: Watershed, subbasin, or planning watershed.

Table 21: Timber Harvest and Relative Landslide Potential in the Western Subbasin.

Western Subbasin Planning Watersheds	Relative Landslide Potential	Silvicultural System and Yarding Methods for THPs 1990 - 2000												Total THPs 1990-2000
		Category 1 Silviculture				Category 2 Silviculture				Category 3 Silviculture				
		Tractor (% of	Cable (% of	Copter (% of	Total (% of	Tractor (% of	Cable (% of	Copter (% of	Total (% of	Tractor (% of	Cable (% of	Copter (% of	Total (% of	TOTAL (% of
Big Finely Creek	Very Low													
	Low													
	Moderate													
	High													
	Very High													
	High/Very High Subtotal													
	Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Honeydew Creek	Very Low									0.0%				
	Low									0.0%			0.0%	0.0%
	Moderate									0.0%			0.0%	0.0%

	High													
	Very High													
	High/Very High Subtotal													
	Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
N. Fork Bear Creek	Very Low													
	Low					0.0%			0.0%	0.0%			0.0%	0.0%
	Moderate					0.0%			0.0%					0.0%
	High					0.0%			0.0%					0.0%
	Very High													
	High/Very High Subtotal					0.0%			0.0%					0.0%
	Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.1%**	**0.0%**	**0.0%**	**0.1%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.1%**
Shenanigan Ridge	Very Low									0.0%			0.0%	0.0%
	Low									0.2%			0.2%	0.2%
	Moderate									0.1%			0.1%	0.1%
	High									0.0%			0.0%	0.0%
	Very High													

	High/Very High Subtotal									0.0%			0.0%	0.0%
	Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.3%**	**0.0%**	**0.0%**	**0.3%**	**0.3%**
S. Fork Bear Creek	Very Low													
	Low													
	Moderate													
	High													
	Very High													
	High/Very High Subtotal													
	Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Squaw Creek	Very Low													
	Low			0.0%	0.0%			0.1%	0.1%			0.0%	0.0%	0.1%
	Moderate			0.0%	0.0%			0.1%	0.1%			0.3%	0.3%	0.4%
	High			0.1%	0.1%			0.0%	0.0%			0.2%	0.2%	0.3%
	Very High			0.0%	0.0%			0.0%	0.0%			0.1%	0.1%	0.1%
	High/Very High Subtotal			0.0%	0.1%			0.1%	0.1%			0.3%	0.3%	0.5%
	Total	**0.0%**	**0.0%**	**0.2%**	**0.2%**	**0.0%**	**0.0%**	**0.2%**	**0.2%**	**0.0%**	**0.0%**	**0.6%**	**0.6%**	**1.0%**

Woods Creek	Very Low									0.2%			0.2%	0.2%
	Low									0.0%			0.0%	0.0%
	Moderate									0.0%			0.0%	0.0%
	High													
	Very High													
	High/Very High Subtotal													
	Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.2%**	**0.0%**	**0.0%**	**0.2%**	**0.2%**

1Refer to Plate 2 and California Geological Survey appendix for relative landslide potential map and description.
2Category 1 silviculture includes clear cut, rehab, seed tree step, and shelter wood seed step prescriptions; Category 2 silviculture includes shelter wood prep step, shelter wood removal step, and alternative prescriptions; Category 3 silviculture includes selection, commercial thin, sanitation salvage, transition, and seed tree removal step prescriptions.
3THP's are complete or active between the 1990 and 2000 timeframe

Table 22: Data Summary Table for the Eastern Subbasin.

Factor	Eastern Subbasin Planning Watersheds											
	Blue Slide		Dry Creek		Eubank Creek		Mattole Canyon		Sholes Creek		Westland Creek	
Relative Landslide Potential[1]		% area		% area		% area		% area		% area		% area
Very Low		0.5%		0.4%		1.5%		1.1%		1.1%		0.7%
Low		10.1%		3.4%		10.9%		9.2%		6.9%		5.1%
Moderate		26.1%		11.3%		26.5%		15.4%		15.5%		14.8%
High		8.0%		12.6%		6.2%		8.2%		9.9%		12.4%
Very High		4.4%		11.9%		5.3%		11.4%		10.4%		9.1%
High/Very High Subtotal		*12.4%*		*24.6%*		*11.6%*		*19.6%*		*20.4%*		*21.5%*
GRAND TOTAL		**49%**		**40%**		**50%**		**45%**		**44%**		**42%**
Landslide and Selected Geomorphic Features		% area		% area		% area		% area		% area		% area
Historically Active Landslide Features Total		**2.6%**		**3.4%**		**0.6%**		**5.5%**		**2.3%**		**2.3%**
Earthflow		2.3%		0.4%		0.3%		4.5%		0.4%		0.8%
Rock Slide		0.2%		0.1%				0.1%				
Debris Slide		0.1%		2.9%		0.3%		0.9%		1.8%		1.4%
Debris Flow								0.0%				
Dormant Landslide Features Total		**9.3%**		**14.5%**		**2.3%**		**5.1%**		**7.4%**		**12.8%**
Selected Geomorphic Features Total		**5.4%**		**17.5%**		**18.5%**		**13.6%**		**16.9%**		**17.2%**
Disrupted Ground		2.0%		0.9%		0.0%		1.5%		1.6%		1.4%
Debris Slide Slope		3.3%		15.7%		17.3%		11.3%		14.3%		14.9%
Inner Gorge (area)[2]		0.1%		0.9%		1.2%		0.8%		1.0%		0.9%
Total of All Above Features		**17.3%**		**35.4%**		**21.5%**		**24.1%**		**26.5%**		**32.2%**
Timber Harvest 1990 -2000[3]	acres	% area	acres	% area	acres	% area	acres	% area	acres	% area	acres	% area
Silviculture Category 1												
Tractor			49	0.3%	37	0.2%			165	0.6%	100	0.6%

Factor	Eastern Subbasin Planning Watersheds											
	Blue Slide		Dry Creek		Eubank Creek		Mattole Canyon		Sholes Creek		Westland Creek	
Cable					77	0.5%			173	0.7%	55	0.3%
Helicopter			7	0.0%								
TOTAL	**0**	**0.0%**	**56**	**0.3%**	**114**	**0.7%**	**0**	**0.0%**	**338**	**1.3%**	**155**	**0.9%**
Silviculture Category 2												
Tractor			280	1.5%	69	0.4%	4	0.0%	168	0.7%	33	0.2%
Cable					15	0.1%			59	0.2%		
Helicopter												
TOTAL	**0**	**0.0%**	**280**	**1.5%**	**84**	**0.5%**	**4**	**0.0%**	**228**	**0.9%**	**33**	**0.2%**
Silviculture Category 3												
Tractor			63	0.3%			43	0.2%	277	1.1%	77	0.5%
Cable											46	0.3%
Helicopter			35	0.2%								
TOTAL	**0**	**0.0%**	**99**	**0.5%**	**0**	**0.0%**	**43**	**0.2%**	**277**	**1.1%**	**123**	**0.7%**
TOTAL	**0**	**0.0%**	**435.23144**	**2.4%**	**198.56804**	**1.3%**	**47.341531**	**0.2%**	**843.63502**	**3.3%**	**311.47949**	**1.8%**
Other Land Uses												
Grazing	481.8	3.7%	188.3	1.0%	358.4	2.3%	876.7	3.8%	624.4	2.4%	441.5	2.6%
Agriculture	5.8	0.0%			0.0	0.0%			10.2	0.0%		
Development					10.4	0.1%						
Timberland, No Recent Harvest	5,441	41.6%	5,979	32.4%	7,143	45.1%	8,180	35.4%	9,312	36.0%	6,221	36.4%
TOTAL	**5,929**	**45.3%**	**6,167**	**33.4%**	**7,512**	**47.5%**	**9,057**	**39.2%**	**9,947**	**38.5%**	**6,662**	**38.9%**
Roads												
Road Density (miles/sq. mile)	5.3		3.6		5.6		3.5		4.0		3.5	
Density of Road Crossings (#/stream mile)	0.8		0.1		0.6		0.5		0.2		0.5	
Roads within 200' of Stream (miles/stream mile)	0.2				0.2		0.1		0.1		0.1	
Streams	% stream length		% stream length		% stream length		% stream length		% stream length		% stream length	
% Stream by Gradient												
< 1% (Response Reach)	12.0%		16.0%		17.0%		11.0%		19.0%		18.0%	
1-4% (Response Reach)	27.0%		9.0%		33.0%		17.0%		18.0%		8.0%	
4-20% (Transport Reach)	48.0%		50.0%		45.0%		50.0%		50.0%		52.0%	

Factor	Eastern Subbasin Planning Watersheds											
	Blue Slide		Dry Creek		Eubank Creek		Mattole Canyon		Sholes Creek		Westland Creek	
>20% (Source Reach)	14.0%		25.0%		5.0%		22.0%		22.0%		22.0%	
Historically Active and Dormant Landslide and Selected Geomorphic Features[4]	% area	% stream length	% area	% stream length	% area	% stream length	% area	% stream length	% area	% stream length	% area	% stream length
Within 180' of Blue Line Stream	15.9%	5.0%	41.4%	68.4%	17.4%	54.7%	21.5%	42.8%	22.4%	54.2%	30.8%	63.8%

1 Refer to California Geological Survey appendix for landslide map (Plate 1), relative landslide potential map (Plate 2) and description.
2 Area based on inner gorges captured as polygons plus inner gorges captured as linear features, which are treated as having an average width of 100 feet.
3 Category 1 includes clear-cut, rehab, seed tree step, and shelter wood seed step prescriptions; Category 2 includes shelter wood prep step, shelter wood removal step, and alternative prescriptions; Category 3 includes selection, commercial thin, sanitation salvage, transition, and seed tree removal step prescriptions.
4 Landslide features and selected geomorphic features include earth flow, rock slide, debris slide, debris flow, debris slide slopes, disrupted ground, eroding banks and inner gorges.
5 EMDS rankings for fish habitat suitability
+++ Fully suitable
++ Moderately suitable
+ Somewhat suitable
- Somewhat unsuitable
- - Moderately unsuitable
- - - Fully unsuitable
U Undetermined
na Information not available

Table 23: Land Use or Type Associated with Landslides in the Eastern Subbasin.

Eastern Subbasin Planning Watersheds	Historically Active Landslide Feature[1]	Entire Subbasin or Planning Watershed		Woodland and Grassland[2]		THPs 1990 - 2000[5]		Timberland, No Recent Harvest[3]		Roads[4]	
			% of Area		% of Area		% of Area		% of Area	Length (miles)	% of Total Length
Blue Slide Creek	Earthflow		4.7%		4.1%				0.6%	1.2	2.2%
	Rock Slide		0.4%		0.1%				0.3%	0.5	0.9%
	Debris Slide		0.3%						0.3%	0.1	0.2%
	Debris Flow										
	All Features		**5.3%**		**4.2%**				**1.1%**	**1.8**	**0.0%**
Dry Creek	Earthflow		1.0%		0.4%		0.0%		0.6%	0.7	1.6%

Eastern Subbasin Planning Watersheds	Historically Active Landslide Feature[1]	Entire Subbasin or Planning Watershed	Woodland and Grassland[2]	THPs 1990 - 2000[5]	Timberland, No Recent Harvest[3]	Roads[4]	
		% of Area	% of Area	% of Area	% of Area	Length (miles)	% of Total Length
	Rock Slide	0.3%	0.0%		0.3%		
	Debris Slide	7.3%	0.6%	0.3%	5.8%	1.9	4.5%
	Debris Flow						
	All Features	**8.6%**	**1.0%**	**0.3%**	**6.7%**	**2.6**	**0.0%**
Eubank Creek	Earthflow	0.7%	0.4%		0.3%	0.5	0.8%
	Rock Slide	0.0%			0.0%		
	Debris Slide	0.6%	0.0%	0.0%	0.5%	0.3	0.5%
	Debris Flow						
	All Features	**1.3%**	**0.4%**	**0.0%**	**0.9%**	**0.8**	**0.0%**
Mattole Canyon (10,499 acres) (54.4 road miles)	Earthflow	9.9%	8.2%		1.5%	5.9	10.8%
	Rock Slide	0.1%	0.0%		0.1%	0.0	0.0%
	Debris Slide	2.0%	0.0%		1.8%	0.8	1.5%
	Debris Flow	0.0%			0.0%		
	All Features	**12.0%**	**8.3%**	**0.0%**	**3.4%**	**6.7**	**0.1%**
Sholes Creek (11,333 acres) (68 road miles)	Earthflow	1.0%	0.6%		0.2%	0.7	1.0%
	Rock Slide	0.2%			0.1%	0.2	0.3%
	Debris Slide	4.1%	0.1%	0.2%	3.6%	1.5	2.2%
	Debris Flow						
	All Features	**5.2%**	**0.7%**	**0.2%**	**4.0%**	**2.4**	**0.0%**
Westland Creek (7,226 acres) (38.2 road miles)	Earthflow	2.0%	1.2%	0.0%	0.8%	1.0	2.6%
	Rock Slide	0.2%			0.1%	0.0	0.0%
	Debris Slide	3.2%	0.0%	0.1%	3.1%	1.0	2.6%
	Debris Flow						
	All Features	**5.4%**	**1.2%**	**0.1%**	**4.0%**	**2.0**	**0.0%**

1 Refer to Plate 1 and California Geological Survey appendix.
2 Woodland and grassland includes areas mapped in 1998 as grassland and non-productive hardwood.
3 Area of timberlands that were not contained in a THP during the 1991 to 2000 period.
4 Roads layer is from the Information Center for the Environment (ICE) at UC Davis.
5 THP's are complete or active between the 1990 and 2000 timeframe.
Empty cells denote zero.
Percent of area is based on the unit of analysis: Watershed, subbasin, or planning watershed.

Table 24: Land Use and Relative Landslide Potential in the Eastern Subbasin.

Planning Watershed	Relative Landslide Potential[1]	Entire Subbasin or Planning Watershed % of Area	Woodland or Grassland[2] % of Area	THPs 1990 - 2000[5] % of Area	Timberland, No Recent Harvest[3] % of Area	Roads[4] Length (miles)	Roads[4] % of Total Length
Blue Slide Creek (6,441 acres) (53.9 road miles)	Very Low	1.0%	0.1%	0.0%	0.8%	0.4	0.7%
	Low	20.5%	3.2%	0.0%	17.3%	14.2	26.3%
	Moderate	53.0%	4.0%	0.0%	49.0%	28.2	52.3%
	High	16.3%	2.9%	0.0%	13.4%	7.4	13.7%
	Very High	8.8%	4.9%	0.0%	4.0%	3.5	6.5%
	High/Very High Subtotal	25.1%	7.8%	0.0%	17.3%	10.9	20.2%
	TOTAL	**100%**	**15%**	**0%**	**84%**	**53.7**	**100%**
Dry Creek (7,327acres) (42.7 road miles)	Very Low	1.0%	0.2%	0.0%	0.5%	0.4	0.9%
	Low	8.6%	1.5%	0.8%	6.0%	5.5	12.9%
	Moderate	28.4%	3.0%	2.0%	23.5%	12.8	30.0%
	High	31.8%	3.8%	2.0%	26.1%	12.7	29.7%
	Very High	30.1%	2.6%	1.1%	25.4%	11.3	26.5%
	High/Very High Subtotal	61.9%	6.5%	3.1%	51.5%	24.0	56.2%
	TOTAL	**100%**	**11%**	**6%**	**82%**	**42.7**	**100%**
Eubank Creek (7,982 acres) (66.2 road miles)	Very Low	2.9%	1.3%	0.0%	1.5%	3.1	4.7%
	Low	21.6%	2.1%	0.4%	19.1%	13.7	20.7%
	Moderate	52.4%	2.5%	1.5%	48.4%	34.9	52.7%
	High	12.3%	0.9%	0.4%	11.1%	7.8	11.8%
	Very High	10.6%	1.0%	0.2%	9.3%	6.6	10.0%
	High/Very High Subtotal	22.9%	1.9%	0.6%	20.4%	14.4	21.8%
	TOTAL	**100%**	**8%**	**2%**	**89%**	**66.1**	**100%**

Planning Watershed	Relative Landslide Potential[1]	Entire Subbasin or Planning Watershed		Woodland or Grassland[2]		THPs 1990 - 2000[5]		Timberland, No Recent Harvest[3]		Roads[4]	
			% of Area		% of Area		% of Area		% of Area	Length (miles)	% of Total Length
Mattole Canyon (10,499 acres) (54.4 road miles)	Very Low		2.5%		0.8%		0.0%		1.1%	3.3	6.1%
	Low		20.3%		2.0%		0.3%		17.8%	12.9	23.7%
	Moderate		33.8%		3.2%		0.1%		30.2%	19.6	36.0%
	High		18.0%		4.1%		0.0%		13.8%	7.1	13.1%
	Very High		25.2%		9.8%		0.0%		15.1%	11.3	20.8%
	High/Very High Subtotal		43.2%		13.9%		0.0%		28.8%	18.4	33.8%
	TOTAL		**100%**		**20%**		**0%**		**78%**	**54.2**	**100%**
Sholes Creek (11,333 acres) (68.0 road miles)	Very Low		2.6%		0.6%		0.2%		1.2%	2.6	3.8%
	Low		15.7%		1.4%		1.7%		12.2%	13.1	19.3%
	Moderate		35.3%		1.7%		3.0%		30.4%	25.2	37.1%
	High		22.7%		2.9%		1.7%		18.0%	16.4	24.1%
	Very High		23.8%		1.8%		1.0%		20.4%	10.8	15.9%
	High/Very High Subtotal		46.5%		4.7%		2.6%		38.4%	27.2	40.0%
	TOTAL		**100%**		**8%**		**7%**		**82%**	**68.1**	**100%**
Westland Creek (7,226 acres) (38.2 road miles)	Very Low		1.6%		0.3%		0.0%		1.0%	0.5	1.3%
	Low		12.1%		1.1%		1.1%		9.9%	3.7	9.7%
	Moderate		35.1%		1.8%		1.7%		31.6%	13.9	36.4%
	High		29.3%		3.4%		0.9%		25.0%	13.5	35.3%
	Very High		21.6%		2.2%		0.6%		18.6%	6.6	17.3%
	High/Very High Subtotal		51.0%		5.6%		1.5%		43.6%	20.1	52.6%
	TOTAL		**100%**		**9%**		**4%**		**86%**	**38.2**	**100%**

1 Refer to Plate 2 and California Geological Survey appendix.
2 Woodland and grassland includes areas mapped in 1998 as grassland and non-productive hardwood.
3 Area of timberlands that were not contained in a THP during the 1991 to 2000 period.
4 Roads layer is from the Information Center for the Environment (ICE) at UC Davis.
5 THP's are complete or active between the 1990 and 2000 timeframe.

Empty cells denote zero.
Percent of area is based on the unit of analysis: Watershed, subbasin, or planning watershed.

Table 12: Recent Timber Harvest Associated with Relative Landslide Potential in the Eastern Subbasin.

Eastern Subbasin Planning Watersheds	Relative Landslide Potential	Silvicultural System and Yarding Methods for THPs 1990 - 2000												Total THPs 1990-2000
		Category 1 Silviculture				Category 2 Silviculture				Category 3 Silviculture				
		Tractor (% of	Cable (% of	Copter (% of	Total (% of	Tractor (% of	Cable (% of	Copter (% of	Total (% of	Tractor (% of	Cable (% of	Copter (% of	Total (% of	TOTAL (% of
Blue Slide Creek	Very Low													
	Low													
	Moderate													
	High													
	Very High													
	High/Very High Subtotal													
	Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Dry Creek	Very Low			0.0%	0.0%	0.0%			0.0%	0.0%			0.0%	0.0%
	Low	0.1%		0.0%	0.1%	0.4%			0.4%	0.3%		0.0%	0.4%	0.9%
	Moderate	0.3%		0.0%	0.3%	1.4%			1.4%	0.2%		0.0%	0.2%	1.9%
	High	0.2%		0.0%	0.2%	1.1%			1.1%	0.3%		0.3%	0.6%	2.0%

	Very High	0.1%			0.1%	0.9%			0.9%	0.0%		0.1%	0.1%	1.1%
	High/Very High Subtotal	0.3%		0.0%	0.3%	2.0%			2.0%	0.3%		0.4%	0.7%	3.1%
	Total	**0.7%**	**0.0%**	**0.1%**	**0.8%**	**3.8%**	**0.0%**	**0.0%**	**3.8%**	**0.9%**	**0.0%**	**0.5%**	**1.3%**	**5.9%**
Eubank Creek	Very Low						0.0%		0.0%					0.0%
	Low	0.1%	0.1%		0.2%	0.2%	0.1%		0.2%					0.4%
	Moderate	0.3%	0.6%		0.9%	0.5%	0.1%		0.6%					1.5%
	High	0.0%	0.2%		0.2%	0.1%	0.0%		0.2%					0.4%
	Very High	0.0%	0.1%		0.1%	0.1%	0.1%		0.1%					0.2%
	High/Very High Subtotal	0.1%			0.3%	0.2%	0.1%		0.3%					0.6%
	Total	**0.5%**	**1.0%**	**0.0%**	**1.4%**	**0.9%**	**0.2%**	**0.0%**	**1.1%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**2.5%**
Mattole Canyon	Very Low									0.0%			0.0%	0.0%
	Low					0.0%			0.0%	0.2%			0.2%	0.3%
	Moderate					0.0%			0.0%	0.1%			0.1%	0.1%
	High									0.0%			0.0%	0.0%
	Very High									0.0%			0.0%	0.0%
	High/Very High Subtotal									0.0%			0.0%	0.0%

	Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.4%**	**0.0%**	**0.0%**	**0.4%**	**0.5%**
Sholes Creek	Very Low				0.0%				0.0%	0.1%			0.1%	0.1%
	Low	0.2%	0.2%		0.4%	0.3%	0.0%		0.3%	1.0%			1.0%	1.7%
	Moderate	0.8%	0.5%		1.3%	0.6%	0.1%		0.7%	1.0%			1.0%	3.0%
	High	0.3%	0.4%		0.6%	0.4%	0.4%		0.7%	0.3%			0.3%	1.7%
	Very High	0.1%	0.5%		0.6%	0.2%	0.1%		0.3%	0.0%			0.0%	0.9%
	High/Very High Subtotal	0.4%	0.9%		1.2%	0.6%	0.4%		1.0%	0.3%			0.3%	2.6%
	Total	**1.5%**	**1.5%**	**0.0%**	**3.0%**	**1.5%**	**0.5%**	**0.0%**	**2.0%**	**2.4%**	**0.0%**	**0.0%**	**2.4%**	**7.4%**
Westland Creek	Very Low									0.0%			0.0%	0.0%
	Low	0.2%	0.1%		0.3%	0.0%			0.0%	0.5%	0.2%		0.7%	1.1%
	Moderate	0.7%	0.2%		0.9%	0.2%			0.2%	0.3%	0.3%		0.6%	1.7%
	High	0.3%	0.2%		0.4%	0.2%			0.2%	0.2%	0.0%		0.2%	0.9%
	Very High	0.2%	0.3%		0.5%	0.0%			0.0%	0.1%	0.0%		0.1%	0.6%
	High/Very High Subtotal	0.5%	0.4%		0.9%	0.3%			0.3%	0.2%	0.1%		0.3%	1.5%
	Total	**1.4%**	**0.8%**	**0.0%**	**2.1%**	**0.5%**	**0.0%**	**0.0%**	**0.5%**	**1.1%**	**0.6%**	**0.0%**	**1.7%**	**4.3%**

1Refer to Plate 2 and California Geological Survey appendix for relative landslide potential map and description.
2Category 1 silviculture includes clear cut, rehab, seed tree step, and shelter wood seed step prescriptions; Category 2 silviculture includes shelter wood prep step, shelter wood removal step, and alternative prescriptions; Category 3 silviculture includes selection, commercial thin, sanitation salvage, transition, and seed tree removal step prescriptions.
3THP's are complete or active between the 1990 and 2000 timeframe

Table 25: Data Summary Table for the Southern Subbasin.

Factor	Southern Subbasin Planning Watersheds			
	Bridge Creek		Thompson Creek	
Relative Landslide Potential[1]		% area		% area
Very Low		5.6%		5.9%
Low		23.3%		23.6%
Moderate		46.1%		47.7%
High		9.7%		9.7%
Very High		15.3%		13.0%
High/Very High Subtotal		*25.0%*		*22.8%*
GRAND TOTAL		**100.0%**		**100.0%**
Landslide and Selected Geomorphic Features		% area		% area
Historically Active Landslide Features Total		**0.2%**		**0.1%**
Earthflow		0.0%		0.0%
Rock Slide		0.0%		0.0%
Debris Slide		0.2%		0.1%
Debris Flow		0.0%		0.0%
Dormant Landslide Features Total		**1.7%**		**1.9%**
Selected Geomorphic Features Total		**41.9%**		**47.0%**
Disrupted Ground		0.0%		0.0%
Debris Slide Slope		39.8%		44.5%
Inner Gorge (area)[2]		2.1%		2.5%
Total of All Above Features		**43.8%**		**49.0%**
Timber Harvest 1990 -2000[3]	acres	% area	acres	% area

Factor	Southern Subbasin Planning Watersheds			
	Bridge Creek		Thompson Creek	
Silviculture Category 1				
Tractor	311	3.0%	124	1.7%
Cable	545	5.3%	282	3.8%
Helicopter				
TOTAL	**856**	**8.4%**	**406**	**5.5%**
Silviculture Category 2				
Tractor	155	1.5%	241	3.3%
Cable	115	1.1%	122	1.7%
Helicopter				
TOTAL	**270**	**2.6%**	**363**	**4.9%**
Silviculture Category 3				
Tractor	34	0.3%	115	1.6%
Cable	14	0.1%	17	0.2%
Helicopter				
TOTAL	**48**	**0.5%**	**132**	**1.8%**
TOTAL	**1,174**	**11.5%**	**901**	**12.2%**
Other Land Uses	acres	% area	acres	% area
Grazing	47.0	0.5%	8.9	0.1%
Agriculture				
Development				
Timberland, No Recent Harvest	8,785	86.0%	6416	86.9%
TOTAL	**8,832**	**86.5%**	**6,425**	**87.0%**
Roads				
Road Density (miles/sq. mile)	5.8		7.5	
Density of Road Crossings (#/stream mile)	1.2		3.0	
Roads within 200' of Stream (miles/stream mile)	0.4		0.5	
Streams	% stream length		% stream length	
% Stream by Gradient				
< 1% (Response Reach)		18.0%		21.0%

Factor	Southern Subbasin Planning Watersheds			
	Bridge Creek		Thompson Creek	
1-4% (Response Reach)		43.0%		46.0%
4-20% (Transport Reach)		30.0%		29.0%
>20% (Source Reach)		9.0%		4.0%
Historically Active and Dormant Landslide and Selected Geomorphic Features[4]	% area	% stream length	% area	% stream length
Within 180' of Blue Line Stream	19.1%	41.9%	21.8%	55.9%

1 Refer to California Geological Survey appendix for landslide map (Plate 1), relative landslide potential map (Plate 2) and description.
2 Area based on inner gorges captured as polygons plus inner gorges captured as linear features, which are treated as having an average width of 100 feet.
3 Category 1 includes clear-cut, rehab, seed tree step, and shelter wood seed step prescriptions; Category 2 includes shelter wood prep step, shelter wood removal step, and alternative prescriptions; Category 3 includes selection, commercial thin, sanitation salvage, transition, and seed tree removal step prescriptions.
4 Landslide features and selected geomorphic features include earth flow, rock slide, debris slide, debris flow, debris slide slopes, disrupted ground, eroding banks and inner gorges.

Table 26: Land Use or Type Associated with Landslides in the Southern Subbasin.

Southern Subbasin Planning Watersheds	Historically Active Landslide Feature[1]	Entire Subbasin or Planning Watershed		Woodland and Grassland[2]		THPs 1990 - 2000[5]		Timberland, No Recent Harvest[3]		Roads[4]	
			% of Area		% of Area		% of Area		% of Area	Length (miles)	% of Total Length
Bridge Creek	Earthflow										
	Rock Slide										
	Debris Slide		0.2%				0.0%		0.2%	0.1	0.1%
	Debris Flow										
	All Features		**0.2%**		**0.0%**		**0.0%**		**0.2%**	**0.1**	**0.1%**
Thompson Creek	Earthflow										
	Rock Slide										
	Debris Slide		0.1%		0.0%				0.1%	0.2	0.2%
	Debris Flow										
	All Features		**0.1%**		**0.0%**		**0.0%**		**0.1%**	**0.2**	**0.2%**

1 Refer to Plate 1 and California Geological Survey appendix.
2 Woodland and grassland includes areas mapped in 1998 as grassland and non-productive hardwood.
3 Area of timberlands that were not contained in a THP during the 1991 to 2000 period.
4 Roads layer is from the Information Center for the Environment (ICE) at UC Davis.
5 THP's are complete or active between the 1990 and 2000 timeframe.
Empty cells denote zero.
Percent of area is based on the unit of analysis: Watershed, subbasin, or planning watershed.

Table 27: Land Use and Relative Landslide Potential in the Southern Subbasin.

Southern Subbasin Planning Watersheds	Relative Landslide Potential[1]	Entire Subbasin or Planning Watershed	Woodland or Grassland[2]	THPs 1990 - 2000[5]	Timberland, No Recent Harvest[3]	Roads[4]

			% of Area		% of Area		% of Area		% of Area	Length (miles)	% of Total Length
Bridge Creek (10,227 acres) (95.6 road miles)	Very Low		5.6%		1.3%		0.4%		3.9%	8.3	8.7%
	Low		23.3%		1.0%		3.7%		18.5%	26.9	28.1%
	Moderate		46.1%		0.0%		5.4%		40.5%	43.6	45.6%
	High		9.7%		0.0%		1.1%		8.6%	6.7	7.0%
	Very High		15.3%		0.0%		0.8%		14.5%	10.1	10.6%
	High/Very High Subtotal		24.9%		0.0%		1.9%		23.0%	16.8	17.6%
	TOTAL		**100%**		**2%**		**11%**		**86%**	**95.6**	**100%**
Thompson Creek (7,417 acres) (81.4 road miles)	Very Low		5.8%		0.6%		0.5%		4.7%	6.1	7.5%
	Low		23.5%		0.3%		3.7%		19.5%	17.7	21.7%
	Moderate		47.5%		0.0%		5.8%		41.7%	40.6	49.9%
	High		9.7%		0.0%		1.0%		8.7%	6.8	8.4%
	Very High		13.0%		0.1%		1.0%		11.9%	9.8	12.0%
	High/Very High Subtotal		22.7%		0.1%		2.0%		20.6%	16.6	20.4%
	TOTAL		**100%**		**1%**		**12%**		**87%**	**81.0**	**100%**

1 Refer to Plate 2 and California Geological Survey appendix.
2 Woodland and grassland includes areas mapped in 1998 as grassland and non-productive hardwood.
3 Area of timberlands that were not contained in a THP during the 1991 to 2000 period.
4 Roads layer is from the Information Center for the Environment (ICE) at UC Davis.
5 THP's are complete or active between the 1990 and 2000 timeframe.
Empty cells denote zero.
Percent of area is based on the unit of analysis: Watershed, subbasin, or planning watershed.

Table 28: Timber Harvest and Relative Landslide Potential in the Southern Subbasin.

Southern Subbasin Planning	Relative Landslide Potential	Silvicultural System and Yarding Methods for THPs 1990 - 2000												Total THPs 1990-2000
		Category 1 Silviculture				Category 2 Silviculture				Category 3 Silviculture				
		Tractor (% of	Cable (% of	Copter (% of	Total (% of	Tractor (% of	Cable (% of	Copter (% of	Total (% of	Tractor (% of	Cable (% of	Copter (% of	Total (% of	TOTAL (% of
Bridge Creek	Very Low	0.1%	0.0%		0.2%	0.1%			0.1%	0.1%			0.1%	0.4%
	Low	1.5%	1.0%		2.5%	0.8%	0.2%		1.0%	0.2%	0.0%		0.2%	3.7%
	Moderate	1.1%	3.0%		4.1%	0.5%	0.7%		1.2%	0.0%	0.1%		0.1%	5.4%
	High	0.3%	0.6%		0.9%	0.1%	0.1%		0.2%		0.0%		0.0%	1.1%
	Very High	0.1%	0.6%		0.7%	0.0%	0.1%		0.1%					0.8%
	High/Very High Subtotal	0.0%	1.2%		1.6%	0.1%	0.2%		0.3%		0.0%		0.0%	1.9%
	Total	**3.0%**	**5.3%**	**0.0%**	**8.3%**	**1.5%**	**1.1%**	**0.0%**	**2.6%**	**0.3%**	**0.1%**	**0.0%**	**0.5%**	**11.4%**
Thompson Creek	Very Low	0.1%	0.0%		0.1%	0.2%	0.0%		0.3%	0.1%	0.0%		0.1%	0.5%
	Low	0.8%	0.7%		1.6%	1.0%	0.2%		1.1%	0.9%	0.0%		0.9%	3.7%
	Moderate	0.6%	1.9%		2.5%	1.7%	1.0%		2.7%	0.4%	0.1%		0.5%	5.8%

	High	0.1%	0.6%		0.7%	0.1%	0.1%		0.2%	0.1%	0.1%		0.1%	1.0%
	Very High	0.0%	0.5%		0.5%	0.1%	0.3%		0.4%	0.1%			0.1%	1.0%
	High/Very High Subtotal	0.1%	1.1%		1.2%	0.2%	0.4%		0.6%	0.1%	0.1%		0.2%	2.0%
	Total	**1.6%**	**3.8%**	**0.0%**	**5.4%**	**3.1%**	**1.6%**	**0.0%**	**4.7%**	**1.6%**	**0.2%**	**0.0%**	**1.8%**	**12.0%**

1Refer to Plate 2 and California Geological Survey appendix for relative landslide potential map and description.
2Category 1 silviculture includes clear cut, rehab, seed tree step, and shelter wood seed step prescriptions; Category 2 silviculture includes shelter wood prep step, shelter wood removal step, and alternative prescriptions; Category 3 silviculture includes selection, commercial thin, sanitation salvage, transition, and seed tree removal step prescriptions.
3THP's are complete or active between the 1990 and 2000 timeframe

Data Quality and Recommendations

Timber Harvest Data

CDF 1941 and 1954 aerial photograph interpretation:

Land use was delineated by placing transparent plastic sleeves directly over the photos and classifying land use change while viewing through a stereoscope. Categories that were delineated were fire, timber harvest, pasture, irrigated crops, orchard, buildings, and urban. Since this is a land use change classification, not all grassland or timberland was delineated or typed. While the full extent of many areas burned by fire could not be estimated, if the fire created a change in vegetation, it was recorded. For example, in 1941, many areas appeared to be burned as evidenced by standing dead trees. In some cases this was recorded as a permanent conversion, usually subjectively determined by proximity to existing grasslands, barns or other buildings, roads, and high fire intensity. This was recorded as a temporary conversion if the fire appeared to be far from existing roads and buildings, thus indicative of a wildfire, or if the fire intensity was low and left substantial tree cover.

Timber harvest activity was broken into silviculture and logging system categories using the closest approximation to the standard definitions. It was apparent that the early harvesting was often a conversion attempt. There is no way of knowing whether the trees removed were old-growth stands that were present prior to European-American settlement or if these were trees that had grown in due to changes in land-use practices between 1860 and 1941. In much of the tan-oak dominated forestland, individual tree crown diameters were often very large and seemed indicative of open growing conditions at some point in time perhaps, as a result of tan-oak bark harvesting or possibly of wildfire. These areas were not mapped since the canopy closure was high at the time of the photos and the cause could not be determined. In some instances trees had been removed or killed and the closest silvicultural category was used. In many of the 1941 photographs, there were no roads or skid trails visible and no logging system was recorded. Since trees were often girdled or burned on-site during this era, this seemed reasonable.

Minimum acreage mapped varied by land use classification. Crops and orchards were mapped when seen. It was assumed that fenced grassland was grazed. Area harvested and silvicultural treatments were the two most difficult categories. The large proportion amount of hardwood and brush was very apparent because there was often a lot of vegetative cover remaining after a harvest that removed most of the conifer. There were many pockets that looked lightly entered with skid trails, may have had a few trees removed, or were excluded from harvest because there was no conifer present. The resultant silviculture was highly variable in many instances. Seed tree removal step was delineated as the silvicultural system used when it appeared that the dominant conifer cover was removed, but considerable hardwood and/or brush remained. When the excluded areas were large relative to the adjacent harvested areas, they were also excluded from the harvest land use polygon.

Disturbance categories were broadly grouped into low, medium and high. Disturbance was based on potential sediment delivery to watercourses. High intensity fire areas, cultivated land and grazed areas immediately adjacent to streams or on steep slopes, and virtually all tractor logging during this time period were classified as high disturbance potential areas. Slides were not mapped although sometimes included as a comment.

The information from the mylar sleeves was inputted as polygon features into the Arcview GIS system by onscreen or “heads-up” digitizing using 1993 black and white orthographic quadrangles as the background. Distortion was corrected by using watercourses, ridges, and roads as reference indicators. The scale distortion apparent in the aerial photographs compared to the orthoquads during the heads-up digitizing was manually corrected by changing the scale of the orthoquad to match the area near the polygon to provide the best fit.

Recommendations

This data is similar to other aerial photograph interpretations of various types of land use. The aerial photos used appeared to be of the same age as the flight date. Many were faded and had hand-drawn line work on them from past projects. When using the data, it is important to note that timber harvesting is often used as a surrogate for a change in vegetation type, size, or density. In a general sense, this is true, but early harvesting did not follow the classic silvicultural methodology and even-aged harvests in particular varied widely in the application on the ground. Disturbance was based on potential sediment delivery to watercourses and was evaluated based on the project level. The harvest data in these layers were not included in the summary harvest tables because the data did not appear to closely match the Mattole Restoration Council Maps and acreage. There were many similarities and differences could be qualitatively adjusted, but the end result would have mixed numbers without providing advantages. The data is used to describe conditions as they appeared in the earliest basin-wide photographic record.

Mattole Restoration Council Digitalized Timber Harvest History Maps

A detailed description of the MRC mapping process is attached in the reference section at the back of this report. Harvest history information up to 1978 is based on the Humboldt and Mendocino County Assessor maps prepared for tax purposes while harvest history between 1978 and 1984 was based on aerial photograph interpretation by MRC staff. The Assessor Maps and the information on them were used for tax assessments when both timberland and standing timber were assessed annually. The base maps were developed especially for this project and, while similar, the maps are not the equivalent of the USGS maps for the same area. The vegetation typing is based on 1960 aerial photograph interpretation work by the office of H. G. Chickering Jr., a consulting aerial photogrammetrist company based in Eugene, Oregon. Harvested timberland that had more than 70 percent of the commercial timber volume removed and thus not taxed was indicated by an “X”. Grassland, not forested, brush, and tree vegetation type and size class information was provided based on 1960 data. The harvested areas in these maps were updated annually when harvesting removed standing timber from the tax rolls. This was recorded by manually delineating the areas on the map by dashed lines and an “X” with the harvest date.

Recommendations

These maps are useful because they were often corrected by the landowner when the tax bill came. In addition, the typing was done by foresters who had local knowledge of the county. Silviculture and logging system type are not specified in the maps because it was common knowledge that the logged areas had at least 70 percent of the commercial conifer removed, thus similar to a shelterwood seed cut or clear-cut while tractor logging was the overwhelmingly dominant operating system. Despite the fact that these maps may under-estimate logged acreage, the maps indicate that most of the available timberland, approximately 93 percent, was harvested by 1983. While the maps were not identical to USGS maps, the digitized acreage for the entire Mattole watershed was within 1 percent. Harvest dates in the digitized maps were grouped into time categories.

CDF Northern Region Forest Practice GIS Timber Harvesting Plan data 1983 to 2000 – Mattole Hydrologic Area

Spatial timber harvesting plan data are digitized into the GIS at a scale of 1:12,000 or better using the on-screen or "heads-up" digitizing method. Digital USGS 1:24000 topographic quadrangles and USGS 24K DLGs (Digital Line Graphs) serve as base data layer. Timber harvesting plan data are derived from THP maps, amendments, and completion reports contained in the THP of record on file with the California of Forestry and Fire Protection in Santa Rosa, California. The USGS 24K DLG data is augmented with features derived from the THP of record. These records were updated by CDF-NCWAP staff to include all filed and approved NTMPs and completion dates.

The State of California and the Department of Forestry and Fire Protection make no representations or warranties regarding the accuracy of data or maps. Neither the State nor the Department shall be liable under any circumstances for any direct, special, incidental, or consequential damages with respect to any claim by any user or third party on account of or arising from the use of data or maps.

Recommendations

These records are not fitted to aerial photographs or orthoquads and may not be precise in location, but timber harvesting plan boundaries appeared to fit pretty well when qualitatively viewed with 1993 orthoquads and 2000 aerial photographs. As mentioned previously, one should be cautious about using silviculture as a surrogate for vegetative cover descriptions; some of the rehabilitation and seed tree removal step prescriptions were almost indistinguishable to the pre-harvest condition when viewing aerial photographs. The files are organized by the date of THP submittal. The time between plan submittal and actual harvest varies, often by several years. This time delay occurs for a variety of reasons including long THP review periods for controversial plans, litigation, and landowner attempts to harvest when the market is most favorable.

NCWAP Mattole Roads Layer

This roads layer was developed to provide additional information for the assessment of the Mattole Watershed as part of the North Coast Watershed Assessment Program. Editing of existing roads layers consisted of at least partially spatially rectifying roads to the 1993 USGS Orthographic Quadrangles available as GIS images. Due to time restrictions, this was not completed, but roads adjacent to watercourses were the highest priority areas. This dataset is based on 1:24000 for road segment spatial accuracy. This data set incorporates existing datasets and maps while also adding road segments digitized from 1993 USGS Orthographic quadrangles. The number of roads in this dataset underestimates the number of logging roads that have been constructed over the years in the Mattole watershed since many of the abandoned roads were not clearly visible. Information describing road segments is partial and biased since some areas are more completely characterized than others due to the incorporation of existing datasets for portions of the watershed.

Recommendations

This data set contains the most comprehensive roads information for the watershed. It is still partial and may be useful for resource management or land use purposes. It does not contain "addressing" information used by emergency services.

Table 29: Comparison of Road Mileage, CDF Roads layer and NCWAP Mattole

Mattole Watershed Location	CDF Roads layer Miles of Road	NCWAP Mattole Miles of Road
Basin-wide	800	1,263
Northern Subbasin	265	356
Eastern Subbasin	204	329
Southern Subbasin	100	179
Western Subbasin	231	400

CalVeg2000 – California Department of Forestry and Fire Protection / United States Forest Service Remote Sensing Laboratory. This land cover data was developed based on 1:24,000 aerial photograph interpretation of land cover (primarily vegetation) as the foundation for an automated, systematic processing of 1998 LANDSAT imagery. This data is still preliminary and is currently receiving an accuracy assessment that includes comparison to permanent inventory plots. It was used for this report because this update was specifically designed to increase accuracy in the life form, dominant tree size, and crown closure typing, all identified as weaknesses in the 1994 data set. The minimum mapping size is 2.5 acres for contrasting types and no minimum mapping size for lakes and conifer plantations.

Recommendations

This program produces the only available data sets that characterize vegetation at the Mattole watershed scale. The minimum mapping size of 2.5 acres limits the use of this data to a general descriptor of vegetation type. In a forest vegetation type, this data does not register habitat attributes of low or occasional frequency such as large trees or snags that may play a vital role in large woody debris recruitment. Sparsely wooded areas with a grass understory suitable for grazing may also be underrepresented in this data set. It is also limited in selecting thin ribbons of higher canopy closure along streams or narrow tree and shrub ribbons of vegetation along streams in a grassland vegetation type although improving the ability to capture this characteristic is one of the objectives of this new data set. For the Mattole watershed, the percentage of area in the broad vegetation types essentially remained the same, the mixed forest category increased two percent while the herbaceous type decreased the same amount. The most noticeable difference was in tree vegetation size.

Table 30: Comparison of WHR Size Classes, 1994 and Calveg 2000 Vegetation Data.

WHR Size	WHR Size Description	1994 Data WHR Size as percent of total area, Mattole Basin	CalVeg 2000 WHR Size as percent of total area, Mattole Basin
0	Grass, barren, not woody vegetation	18 %	18 %
1	Seedling (less than 1" DBH)	0	0
2	Sapling (1-6"DBH)	2	<1
3	Pole (6-11"DBH)	27	11
4	Small Tree (11-24"DBH)	28	52
5	Med/Large Tree (24" and greater DBH)	25	20

The following website location is provided for additional information on the new data set:

Warbington, R., B. Schwind, C. Curlis and S. Daniel. 1998. Creating a Consistent and Standardized Vegetation Database for Northwest Forest Plan Monitoring.

Humboldt County Parcel Map - Humboldt County Community Development Services

This draft GIS layer is owned by Humboldt County. The boundary location data is suspect for spatial inaccuracies and owner information is not current. Owner names vary according to the legal title so the same owner may have several different listings in the owner field.

Recommendations

This GIS layer is useful in examining patterns of ownership and for general planning projects. Since owner names vary, categorizing holdings by individual owner is labor intensive and a matter of some guesswork.

Mendocino County Parcel Map - Mendocino County Planning Department

This GIS layer is owned by Mendocino County. The boundary location data is suspect for spatial inaccuracies and owner information is updated regularly. Owner names vary according to the legal title so the same owner may have several different listings in the owner field.

Recommendations

This GIS layer is useful in examining patterns of ownership and for general planning projects. Since owner names vary, categorizing holdings by individual owner is labor intensive and a matter of some guesswork.

Data Sources and Availability

Aerial photographs for Humboldt County taken between 1941 and 2000 are available for on-site viewing at the California Geologic Service office at 2120 Campton Rd , Suite D, Eureka, CA 95503. contact: Mr. Gerald Marshall (707)441-5742.

Aerial photographs on CD for Humboldt County in selected years are available for on-site viewing at the North Coast Watershed Assessment Program office at 1487 Sandy Prairie Ct., Fortuna, CA 95540. contact: Mr. Scott Downie (707)725-1051

Aerial photographs on CD covering most of the Humboldt County portion of the Mattole watershed taken in 1974 are available for on-site viewing at the NCWAP office. These are copies of the aerial photographs archived at the Humboldt County Assessors Office. North Coast Watershed Assessment Program office at 1487 Sandy Prairie Ct., Fortuna, CA 95540. contact: Mr. Scott Downie (707)725-1051.

Aerial photographs covering the Mattole watershed for selected years may be available for viewing at the Mattole Restoration Council office at PO Box 160, Petrolia, CA 95558. contact: Mr. Chris Larson (707)629-3514.

Aerial photographs covering the Mendocino County portion of the Mattole watershed taken between 1952 and 1993 are available for on-site viewing at the Department of Forestry and Fire Protection office at 17501 N. Highway 101. Willits, CA 95490. contact: (707)459-7446.

Aerial photographs covering the Mendocino County portion of the Mattole watershed taken in 1972 are available for on-site viewing and loan for a fee at the Mendocino County Assessor Office at 501 Low Gap Rd. Ukiah, CA 95482. contact: (707)463-4311.

Aerial photographs covering the Mendocino County portion of the Mattole watershed taken in 1952 are available on loan for a fee at the Mendocino County Historical Museum at 400 E. Commercial St. Willits, CA 95490. contact: 459-2736.

1998 USFS Vegetation data layer used in this report is called CALVEG2000. It is a product of the CDF - FRAP/USFS - RSL: Land Cover Mapping and Monitoring Program. This data layer and the data documentation are available through the Frap website www.frap.ca.gov. A clipped portion covering only the Mattole watershed will be available on NCWAP data website, and at the Fortuna NCWAP office. Further information: Mr. Scott Downie (707)725-1051.

CDF GIS Timber Harvesting Plan data 1983 to 2000 – Mattole Watershed. A clipped portion of the dataset covering only the Mattole watershed and standard documentation will be available on the KRIS Mattole CD, the NCWAP data website, and at the Fortuna NCWAP office. For further information contact: CDF Northern Region Forest Practice GIS. Suzanne Lang, GIS Coordinator (707) 576-2955.

MRC Harvest History. This data layer and the data documentation will be available on the KRIS Mattole CD, the NCWAP data website, and at the Fortuna NCWAP office. It is also available at the Mattole Restoration Council office at PO Box 160, Petrolia, CA 95558. contact: Mr. Chris Larson (707)629-3514.

References

Ami, Goldberg. Ettersburg Ranch Years. The Humboldt Historian. Sept-Oct.85:6.

Anders, Jentri, PhD. The History and Sociology of the Human Presence in Honeydew Creek Watershed, Mattole River, Southern Humboldt County, California. For the U.S. Bureau of Land Management, Arcata Resource Area. November 1, 1995.

Barbour, Michael and others. c2001. Coast Redwood: A Natural and Cultural History. Cachuma Press. Los Olivos, CA.

Blencowe, Craig. Forest Management Plans for various California Department of Forestry CFIP projects, 1986-1988.

Cafferata, Peter H. and Thomas E. Spittler. 1998. Logging Impacts of the 1970's vs. the 1990's in the Caspar Creek Watershed. *In* Proceedings of the Conference on Coastal Watersheds: The Caspar Creek Story. May 6, 1998. Ukiah, CA. Gen. Tech. Rep. PSW-GTR-168. Albany, CA: Pacific Southwest Station, Forest Service, U.S. Department of Agriculture; 149 p. http://www.psw.fs.fed.us/techpub.html.

California Department of Forestry and Fire Protection. 2002(draft). Fire Management Plan. Prepared by California Department of Forestry and Fire Protection, Humboldt Del Norte Unit.

Clark, T.K. c1983. Regional History of Petrolia and the Mattole Valley. Miller Press. Eureka, CA.

Cook, Margarite and Diane Hawk. 1997. In the Early Days: Southern Humboldt History, 1853-1920. Hawk Mountaintop Publishing. Piercy, CA.

Elliot, Wallace W. and Co. 1881. History of Humboldt County, California. W.W. Elliot & Co.

Florsheim, J., 1995. Geomorphic effects of disturbance to river channels. Watersheds '94. Proceedings of the 5th Biennial Watershed Management Conference. U. C. Water Resources Center Report, no. 86. U.C. Davis, pp. 5-10.

Goodridge, Jim., 2002. California Weather. Compact disc containing a comprehensive collection of meteorological data for California, data compilation, analysis, and articles dated 5/5/2002.

Gucinski, H., M.J. Furniss, R.R. Ziemer, M.H. Brookes, editors. 2001. Forest roads: a synthesis of scientific information. Gen. Tech. Rep. NW-GTR-509. U.S. Department of Agriculture, Forest Service. Pacific Northwest Research Station. Portland, OR. 103 p. http://www.fs.fed.us/pnw/pubs/gtr509.pdf

Keithley, C. 1999. Evaluating Stream and Watershed Conditions in Northern California. Prepared for the California Department of Forestry, Fire and Resource Assessment Program. Sacramento, CA. 17 pp.

Knopp, C. 1993. Testing Indices of Cold Water Fish Habitat. Final Report for Development of Techniques for Measuring Beneficial Use Protection and Inclusion into the North Coast Region's Basin Plan by Amendment of the.....Activities,

September 18, 1990. North Coast Regional Water Quality Control Board in cooperation with California Department of Forestry. 57 pp.

Larson, Chris. Restoration Takes Root in the Mattole Valley, Residents Grasp the Watershed Concept. In The Eel River Reporter. A Publication of Friends of the Eel River. Vol IV, Issue 3. Fall/Winter 2001.

Lewis, David J., K. Tate, J. Harper, and J. Price. 2001. Survey identifies sediment sources in North Coast rangelands. California Agriculture. Volume 55, Number 4, July-August 2001. pp. 32-37.

Lewis, Jack. 1998. Evaluating the Impacts of Logging Activities on Erosion and Suspended Sediment Transport in the Caspar Creek watersheds. *In* Proceedings of the Conference on Coastal Watersheds: The Caspar Creek Story. May 6, 1998. Ukiah, CA. Gen. Tech. Rep. PSW-GTR-168. Albany, CA: Pacific Southwest Station, Forest Service, U.S. Department of Agriculture; 149 p. http://www.psw.fs.fed.us/techpub.html.

Ligon, F., A. Rich, G. Rynearson, D. Thornburgh, and W. Trush. 1999. Report of the Scientific Review Panel on California Forest Practice Rules and Salmonid Habitat. Prepared for the Resources Agency of California and the National Marine Fisheries Service. Sacramento, CA. 181 pp.

Lisle, Thomas. 1999. How Much Dead Wood in Stream Channels is Enough? Paper presented at the Symposium on Dead Wood in Forest Ecosystems, November 2-4, 1999, in Reno, Nevada.

Mattole Restoration Council. 1995. Dynamics of Recovery: A Plan to Enhance the Mattole Estuary. ELEMENTS OF RECOVERY. Petrolia, CA.

Mattole Restoration Council. 1989. Elements of Recovery: An Inventory of Upslope Sources of Sedimentation in the Mattole River Watershed, with Rehabilitation Prescriptions and Additional Information for Erosion Control Prioritization. ELEMENTS OF RECOVERY for the California Department of Fish & Game. Petrolia, CA. 47pp.

Mattole Union School. 1962. The Book of Petrolia: Its History, Land and People , by the Children and Teachers of the Mattole Union School, with the Help of the Whole Community. Mattole Union School District. Petrolia, CA.

Miner, George “Buck”. 1996. The Origin of Mattole Through the Eyes of a Salmon. George “Buck” Miner. Petrolia, CA.

Monitoring Study Group. 1999. Hillslope Monitoring Program: Monitoring Results from 1996 through 1998. Interim Report to the State Board of Forestry and Fire Protection. Prepared by the Monitoring Study Group to the State Board of Forestry. 82 p. Available at: http://www.fire.ca.gov/BOF/pdfs/rept9.PDF

Napolitano, Michael. Effects of Recent Logging on the Main Channel of North Fork Caspar Creek. *In* Proceedings of the Conference on Coastal Watersheds: The Caspar Creek Story. May 6, 1998. Ukiah, CA. Gen. Tech. Rep. PSW-GTR-168. Albany, CA: Pacific Southwest Station, Forest Service, U.S. Department of Agriculture; 149 p. http://www.psw.fs.fed.us/techpub.html.

National Council of the Paper Industry for Air and Stream Improvement, Inc. (NCASI). 1999. Scale considerations and the detectability of sedimentary cumulative watershed effects. Technical Bulletin No. 776. Research Triangle, N.C.:National Council of the Paper Industry for Air and Stream Improvement, Inc. http:/www.publications@ncasi.org. or wmegahan@ncasi.org.

O’Dell, Tharon E. 1996. Silviculture in the Redwood Region: An Historical Perspective. I*n* Proceedings of the Conference on Coast Redwood Forest Ecology and Management.

Ozaki, Vickie L. and Mary Ann Madej. 1996. Long-Term Channel Response To Large Floods And Sedimentation. *In* Proceedings of the Conference on Coast Redwood Forest Ecology and Management.

Pacific Lumber Company. January 1999. Final Environmental Impact Statement/Environmental Impact Report and Habitat Conservation Plan/Sustained Yield Plan for the Headwaters Forest Project.

Pacific Watershed Associates. October 2001. Summary Report 2001 S.B. 271 Watershed Assessment and Erosion Prevention Planning Project for the Upper Mattole River, Humboldt and Mendocino County, California. Prepared for Sanctuary Forest, Inc. and the California Department of Fish and Game.

Popenoe, J. H. 1987. Soil Series Descriptions and Laboratory Data from Redwood National Park. Redwood National Park Technical Report No. 20. Orick, California. 49 pp. Plus appendices.

Raphael, Ray. 1977. An Everyday History of Somewhere.

RNSP, Division of Resource Management and Science, 1999. Redwood Creek Watershed Analysis (draft) Arcata, California, Redwood National and State Parks.

Roscoe, Jamie. 1977. The Mattole Valley: Economic Survival in a Rural Community 1977 Barnum Competition essays, Humboldt State University. Available in the Humboldt Room, Humboldt County Library, Eureka and the Humboldt Room, Humboldt State University. 24pp.

Roscoe, Ken. 1991. Heydays in Humboldt: the True History of the Mattole Valley and the Lost Coast of Humboldt County. Illiana, Ltd. Arcata, CA.

Roscoe, Stanley “Neb”. 1996. Heydays in Mattole: More Wild Tales of the Mattole Valley and the Lost Coast of Humboldt County. Illiana, Ltd. McKinleyville, CA.

Roscoe, W.W. c1940. A History of the Mattole Valley. Locally published and available at the Mattole Historical Society and the Humboldt Room in the Eureka branch of the Humboldt County Library.

Spittler, Thomas E. 1995. Pilot Monitoring Program: Geologic Input for the Hillslope Component.

Surfleet, Christopher G., and Robert R. Ziemer. 1996. Effects of Forest Harvesting on Large Organic Debris in Coastal Streams. In Proceedings of the Conference on Coast Redwood Forest Ecology and Management.

Timber Harvesting Plans filed with the California Department of Forestry and Fire Production:

THP 1-00-386 HUM; THP 1-01-276 HUM; THP 1-01-052 HUM; THP 1-99-336 HUM;

THP 1-96-171 HUM; THP 1-98-301 HUM; THP 1-01-052 HUM

And others that received a brief reading.

USDI Bureau of Land Management Arcata Resource Area. May 1995. Bear Creek Watershed Analysis.

USDI Bureau of Land Management Arcata Resource Area. November 1996. Honeydew Creek Watershed Analysis.

USDI Bureau of Land Management Arcata Resource Area. July 2001. Mill Creek Watershed Analysis.

Vargo, J. 1979. Mill Creek Watershed Monograph. Unpublished.

Zeimer, Robert. 1998. Flooding and Stormflows. *In* Proceedings of the Conference on Coastal Watersheds: The Caspar Creek Story. May 6, 1998. Ukiah, CA. Gen. Tech. Rep. PSW-GTR-168. Albany, CA: Pacific Southwest Station, Forest Service, U.S. Department of Agriculture; 149 p. http://www.psw.fs.fed.us/techpub.html.

Ziemer, Robert R., Lewis, Jack, and Elizabeth T. Keppeler. 1996. Hydrologic Consequences of Logging Second-Growth Redwood Watershed. *In* Proceedings of the Conference on Coast Redwood Forest Ecology and Management.

Zinke, Paul J., Stangenberger, Alan G., and James L. Bertenshaw. 1996. pattern and Process in forests of Sequoia Sempervirens (D.Don) Endl. *In* Proceedings of the Conference on Coast Redwood Forest Ecology and Management.

Zwieniecki, Maciej A. and Michael Newton. 1999. Influence of Streamside Cover and Stream Features on Temperature Trends in Forested Streams of Western Oregon. Western Journal of Applied Forestry. 14(2):106-113.

1854 newspaper clipping on John Hill's exploration of the Mattole. Susan Baker Fountain Papers. Vol. 110, pg 107.

<u>Maps:</u>

Department of the Interior Geologic Survey. 1969. Bear Harbor Quadrangle 7.5 minute map. U.S. Geologic Survey. Denver, CO.

Department of the Interior Geologic Survey. 1969. Briceland Quadrangle 7.5 minute map. U.S. Geologic Survey. Denver, CO.

Department of the Interior Geologic Survey. 1970. Buckeye Mtn. Quadrangle 7.5 minute map. U.S. Geologic Survey. Denver, CO.

Department of the Interior Geologic Survey. 1969. Bull Creek Quadrangle 7.5 minute map. U.S. Geologic Survey. Denver, CO.

Department of the Interior Geologic Survey. 1969. Cape Mendocino Quadrangle 7.5 minute map. U.S. Geologic Survey. Denver, CO.

Department of the Interior Geologic Survey. 1969. Cooskie Creek Quadrangle 7.5 minute map. U.S. Geologic Survey. Denver, CO.

Department of the Interior Geologic Survey. 1969. Ettersburg Quadrangle 7.5 minute map. U.S. Geologic Survey. Denver, CO.

Department of the Interior Geologic Survey. 1970. Honeydew Quadrangle 7.5 minute map. U.S. Geologic Survey. Denver, CO.

Department of the Interior Geologic Survey. 1969. Shelter Cove Quadrangle 7.5 minute map. U.S. Geologic Survey. Denver, CO.

Department of the Interior Geologic Survey. 1969. Shubrick Peak Quadrangle 7.5 minute map. U.S. Geologic Survey. Denver, CO.

Department of the Interior Geologic Survey. 1969. Petrolia Quadrangle 7.5 minute map. U.S. Geologic Survey. Denver, CO.

Department of the Interior Geologic Survey. 1969. Taylor Peak Quadrangle 7.5 minute map. U.S. Geologic Survey. Denver, CO.

Department of the Interior Geologic Survey. 1969. Weott Quadrangle 7.5 minute map. U.S. Geologic Survey. Denver, CO.

Airphotos:

CDF. 1963/1964. Black and white aerial photos. Flight MEN. Flight Line 5, Frames 1-5, 12-13, 21-25; Flight Line 15, Frames 59-63, 89-92. Scale 1:20,000.

Flight CVL. 1941/1942. Black and white aerial photos. Flight Line 01B, Frames 53-69, 73-93, 199-212, 215-231; Flight Line 2B, Frames 77-87, 106-128; Flight Line 3B, Frames 78-93; Flight Line 9B, Frames 01-15, 53-65, 175-198; Flight Line 10B, Frames 01-19, 40-54, 89-96; Flight Line 11B, Frames 126-128. Scale 1:20,000.

Flight CVL. 1954. Black and white aerial photos. Flight Line 7N, Frames 24-34, 50-71, 103-125, 132-160; Flight Line 8N, Frames 18-30, 40-55, 90-108, 125-145; Flight Line 9N, Frames 81-83, 90-120; Flight Line 10N, Frames 1-15, 105-123, 129-138, 151-166; Flight Line 11N, Frames 63-70; Flight Line 12N, Frames30-42. Scale 1:20,000.

Flight CVL. 1965. Black and white aerial photos. Flight Line 8FF, Frames 30-47; Flight Line 10FF, Frames 1-8, 29-45, 46-62, 86-100, 116-122, 123-139; Flight Line 18FF, Frames 1-18, 29-43, 44-57, 99-110, 111-117, 153-158; Flight Line 20FF, Frames 199-207. Scale 1:20,000.

Flight WAC. 2000. Black and white aerial photos. Flight Line 7, Frames 191-199, 165-178, 136-147, 91-104, 51-64, 3-16; Flight Line 6, Frames 179-191, 98-111, 4-15; Flight Line 4, Frames 1-7, 83-86. Scale 1:7,000.

GIS:

CDF - various

Barnum Timber Company - roads layer

BLM – various GIS layers

Sanctuary Forest – draft roads layer

Humboldt County Planning Dept. – parcel and roads layers

Digitization of Forest Harvest History maps from Elements of Recovery - Mattole Restoration Council October 2001

Mattole Restoration Council Report to The California Department of Forestry and Fire Protection

In 1987, under contract to the California Department of fish and game (DFG), the Mattole Restoration Council (ELEMENTS OF RECOVERY) began to inventory upslope sources of sedimentation in the Mattole watershed. The goal of the contract was to develop erosion control and salmonid habitat enhancement projects wherever appropriate, and to gain a better understanding of how to prioritize the work.

> *Inventory procedures were determined by the requirements of a contract with DFG and by a technical team chosen by the ELEMENTS OF RECOVERY. The project coordinator was Freeman House. The technical team consisted of Freeman House, Janet Morrison, Gary Peterson, David Simpson, and Randall Stemler. The technical team frequently consulted with Geologists Terry Sprieter, David Burnson, and David Steenson. The work undertaken produced maps that showed Timber Harvest History and Soil Disturbance. The watershed was divided into 12 contiguous drainage areas. Five of the drainage area maps were of the five largest tributaries in the watershed. The other seven were selected to whatever degree possible for their common geomorphology.*

The comprehensiveness of the survey was severely limited by two elements, budget and access. Overall, more than 10% of Mattole landowners eventually participated in the survey.

Historically, timber harvesting (clear-cutting in particular) and road building associated with timber harvesting have caused more large-scale erosion than any other land use practice. In the Mattole river watershed, more than 91% of the original coniferous forests have been harvested at least once.

Timber harvest records were kept by Humboldt County between 1962 and 1978 on maps at a scale of one inch = one thousand feet. Data on the maps was based on 1960 aerial photography. Copies of these maps were purchased from the Humboldt County Assessor’s office; a copy is available in the ELEMENTS OF RECOVERY office. Mendocino County kept much sketchier records during the same time period. The parts of the Mattole watershed which overlap with Mendocino County may display a higher incidence of inaccuracy than does the larger part that lies in Humboldt. In order to extend the harvest records to the time when the surveys were done, the ELEMENTS OF RECOVERY relied on 1984 aerial photographs at a scale of 1 inch = 400 feet, prepared by W.A.C. Corporation, 520 Conger St., Eugene OR 97402. The ELEMENTS OF RECOVERY also used the same photographs in stereo pairs at the scale of 1 inch = 2,640 feet. All photos are available in the ELEMENTS OF RECOVERY office, in addition to 1988, 1992, and 1996 aerial photos.

Data from the assessor’s maps were transferred by hand to an overlay on a fifteen-minute topographic map. The drawings were then digitally scanned and the legend added using MacPaint and Super MacPaint programs from Apple Computer, Inc. In order to translate the county assessor’s maps to a reproduceable scale, the copies were reduced to fifty percent of their original size xerographically. This process produced some distortion, and the **maps should be used for comparative purposes only.**

The legend attached to the timber harvest maps is for the most part self explanatory, but some clarification is in order.

ROADED AND CUT 1975-1983 (R&C 1975-1983 on ArcView map legend), and ROADED AND CUT 1984-1989 (R&C 1984-1989 on ArcView map legend) on overlap in time with the category RE-ENTERED SINCE 1979 (RE >1979 on ArcView map legend). The first categories have been used whenever forestland was commercially harvested for the first time during that time period. The second category is used when a harvest during that time period is demonstrably the second commercial harvest that has taken place on that property. In most cases where this grid is used, the first harvest occurred prior to 1962. The category OTHER includes forestlands that are predominately hardwoods, and also brushlands and gravel bars. The category OLD GROWTH describes coniferous forests of twenty acres or more that have a continuous canopy of Douglas fir or redwood. Most of these areas have never been commercially logged, but field inspection of a few of these parcels revealed that some of them have been "high graded" at some indeterminate time in the past.

In October 2001, CDF asked ELEMENTS OF RECOVERY to digitize these maps, to be used for analyses purposes in the North Coast Watershed Assessment Project (NCWAP). ELEMENTS OF RECOVERY used the original digitally scanned files (JPG's) of the drainage areas and imported them into ArcView using Image Analysis to geo-rectify them. A new polygon theme was then created, digitizing all polygons for each drainage area map. It is important to note that the drainage outlines of the jpg's did not exactly match with drainage outlines of the sub-watersheds (as well as the overall watershed outline) as defined by the ArcView program in work previously done by the ELEMENTS OF RECOVERY. Therefore, the polygons outlined in the new coverage will only give approximate analysis numbers.

Total acreage digitized:

- 192,011.234

Estimated acreages in each category for the entire Mattole watershed are as follows:

- Grasslands: 33,504.393
- Old Growth 14,390.520
- Other 38,827.781
- R&C <1962 72,896.545
- R&C 1962-1974 21,141.339
- R&C 1975-1983 6,947.538
- R&C 1984-1989 1,510.746
- RE >1979 2,792.372

Estimated acreages for drainage basins as done in original work are as follows:

<u>Headwaters:</u>

- Grasslands 707.112
- Old Growth 527.820
- Other 3,442.481
- R&C <1962 9,189.639

- R&C 1962-1974 546.559
- R&C 1975-1983 1,095.793
- R&C 1984-1989 0
- RE >1979 2,422.212

Eubanks

- Grasslands: 1,538.858
- Old Growth 525.257
- Other 4,926.253
- R&C <1962 4,858.184
- R&C 1962-1974 1,291.423
- R&C 1975-1983 470.210
- R&C 1984-1989 0
- RE >1979 0

Bear

- Grasslands: 822.684
- Old Growth 2,449.066
- Other 4,989.002
- R&C <1962 3,576.004
- R&C 1962-1974 1,311.301
- R&C 1975-1983 915.412
- R&C 1984-1989 0
- RE >1979 0

Grindstone

- Grasslands: 2,982.537
- Old Growth 682.627
- Other 2,767.220
- R&C <1962 7,011.041
- R&C 1962-1974 3,381.918
- R&C 1975-1983 323.375
- R&C 1984-1989 0
- RE >1979 0

Dry

- Grasslands: 1,733.882
- Old Growth 1,242.401
- Other 2,231.551
- R&C <1962 6,543.948
- R&C 1962-1974 2,357.482
- R&C 1975-1983 1,680.034
- R&C 1984-1989 93.050
- RE >1979 0

Harrow

- Grasslands: 897.830
- Old Growth 523.183

- Other 1,651.950
- R&C <1962 4,951.636
- R&C 1962-1974 1,644.617
- R&C 1975-1983 1,205.901
- R&C 1984-1989 122.488
- RE >1979 299.473

LE Honeydew

- Grasslands: 947.778
- Old Growth 2,260.225
- Other 4,575.211
- R&C <1962 3,999.097
- R&C 1962-1974 460.817
- R&C 1975-1983 54.417
- R&C 1984-1989 0
- RE >1979 0

Squaw

- Grasslands: 2,575.852
- Old Growth 1,284.726
- Other 3,186.522
- R&C <1962 7,215.274
- R&C 1962-1974 1,271.968
- R&C 1975-1983 69.964
- R&C 1984-1989 0
- RE >1979 0

Conklin

- Grasslands: 5,723.583
- Old Growth 245.593
- Other 1,575.432
- R&C <1962 8,174.460
- R&C 1962-1974 2,138.407
- R&C 1975-1983 338.940
- R&C 1984-1989 692.198
- RE >1979 0

N. Forks

- Grasslands: 12,046.746
- Old Growth 4,126.270
- Other 5,593.246
- R&C <1962 1,354.783
- R&C 1962-1974 5,426.204
- R&C 1975-1983 644.102
- R&C 1984-1989 603.010
- RE >1979 0

Mouth

- Grasslands: 3,527.571

- Old Growth 493.352
- Other 3,982.213
- R&C <1962 3,865.479
- R&C 1962-1974 1,310.643
- R&C 1975-1983 149.390
- R&C 1984-1989 0
- RE >1979 70.687

Estimated acreages broken out by NCWAP identified sub-basins:

Northern

Includes parts or all of: Conklin, Dry, N. Forks, LE Honeydew, Mouth, and Squaw drainages from Elements of Recovery digitized maps.
Calwater basins: Joel Flat, Long Ridge, Apple Tree, Rainbow, Petrolia, Cow Pasture Opening, McGinnis, Oil Creek, Rattlesnake.

- Grasslands: 19,479.203
- Old Growth 4,347.298
- Other 8,193.807
- R&C <1962 21,554.852
- R&C 1962-1974 7,675.115
- R&C 1975-1983 967.880
- R&C 1984-1989 1,299.094
- RE >1979 0

Western

Includes parts or all of: Bear, Conklin, Dry, Eubanks, N. Forks, Harrow, Headwaters, LE Honeydew, Mouth, Squaw drainages from Elements of Recovery digitized maps.
Calwater basins: Shenanigan Ridge, Camp Mattole, Squaw Creek, Woods Creek, Honeydew Creek, North Fork Bear Creek, Big Finley, South Fork Creek.

- Grasslands: 6,353.304
- Old Growth 6,905.927
- Other 17,560.004
- R&C <1962 20,543.664
- R&C 1962-1974 5,222.004
- R&C 1975-1983 1,584.357
- R&C 1984-1989 0
- RE >1979 70.687

Eastern

Includes parts or all of: Bear, Dry, Eubanks, N. Forks, Harrow, Headwaters, Grindstone drainages from Elements of Recovery digitized maps.
Calwater basins: Dry Creek, Sholes Creek, Westlund Creek, Mattole Canyon, Blue Slide, Eubank Creek.

- Grasslands: 6,223.346
- Old Growth 2,440.758
- Other 9,260.719

- R&C <1962 21,431.009
- R&C 1962-1974 7,638.916
- R&C 1975-1983 3,287.701
- R&C 1984-1989 211.652
- RE >1979 299.473

Southern

Includes parts or all of: Bear, Eubanks, and Headwaters drainages from Elements of Recovery digitized maps. Calwater basins: Bridge Creek, Thompson Creek.

- Grasslands: 713.577
- Old Growth 490.376
- Other 3,402.174
- R&C <1962 8,874.868
- R&C 1962-1974 545.917
- R&C 1975-1983 1,053.251
- R&C 1984-1989 0
- RE >1979 2,389.052

End ELEMENTS OF RECOVERY Report/ End Land Use Appendix.